DOWD, D.L. Physical culture
for home and school.
Scientific and practical

1892

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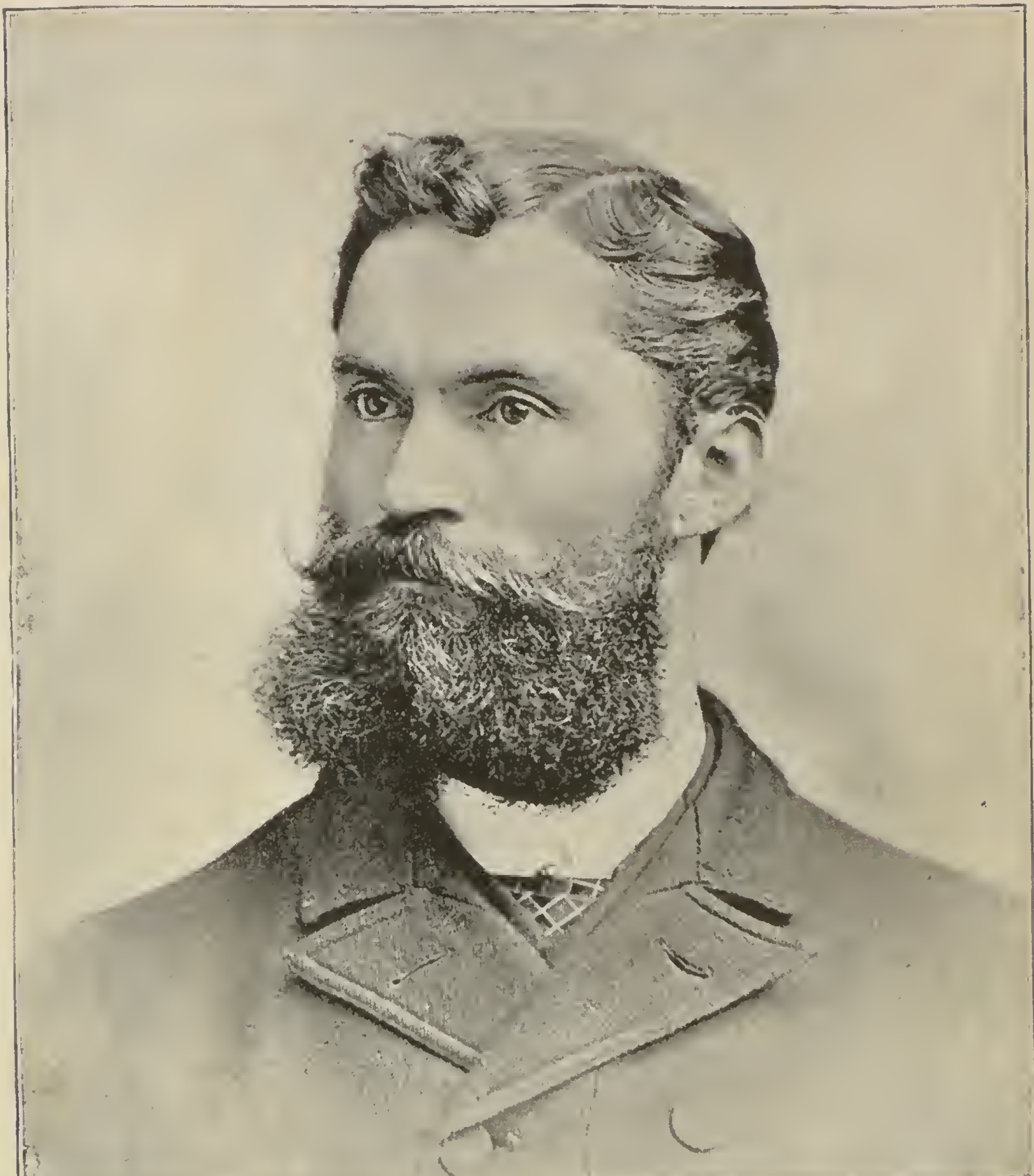

D. L. Dowd

PHYSICAL CULTURE

FOR HOME AND SCHOOL

SCIENTIFIC AND PRACTICAL

BY

PROFESSOR D. L. DOWD

SCHOOL FOR PHYSICAL AND VOCAL CULTURE, NO. 9 EAST FOURTEENTH STREET, NEW YORK.

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To

WILLIAM E. FOREST, B.S., M.D.,

NEW YORK,

AND

W. H. JORDAN,

SPRINGFIELD, MASS.,

MY EXCELLENT FRIENDS AND BENEFACTORS, AND PROMOTERS OF

ALL THAT TENDS TO A BETTER MANHOOD,

THIS HUMBLE VOLUME

IS INSCRIBED.

PREFACE.

In presenting this work to the public, I have endeavored to point out, as plainly as I could, a system of rational and practical physical culture, based on scientific principles, and yet made so simple that a child could understand the principles, and be benefited by their practice. I have long felt there was a growing demand for a more intelligent and practical method of teaching physical culture than has hitherto been presented; a method that would not only develop muscle, for muscle's sake, but for health's sake, and for the sake of intellect, morality, and beauty; a method that would explain the reason of each principle set forth, and leave no one to take it for granted that it must be so, but appeal to each one's intelligence, that he or she might be able to give a clear, concise reason for what is done, and

thus make the work instructive, interesting, and even delightful.

This method of physical culture is especially fitted for the home and school, where little apparatus can be used; and have it as efficient and beneficial as though the house were full of appliances, with a thorough knowledge of how to use it all.

If our thousands of flat-chested boys and girls would give but a half, or a whole hour a day to the breathing and chest exercises, as directed, we should see fewer worn-out men and women at the age of thirty or forty, when they ought to be just entering on the prime of life. I am glad to observe that the signs are pointing to a rapidly increasing interest in physical education. People are exercising more, and relying less on the skill of physicians to keep the lamp of life burning. They are looking for a surer way. Science is advancing, and may we not hope that one day the doctor's prescription, written in his office, will read: "One hour of chest and lung exercise every morning for four weeks in my next room, before, or after going to business?"

This book has been written with the hope that it may do substantial service to suffering humanity, and find its way where it can do most good—at the home and school. When this hope has been realized I shall feel rewarded for my labors. THE AUTHOR.

NEW YORK, December, 1886.

CONTENTS.

CHAPTER I.

CHAPTER II.

CHAPTER III.

CHAPTER IV.

CHAPTER V.

CHAPTER VI.

CHAPTER VII.

CHAPTER VIII.

CHAPTER IX.

CHAPTER XII.

LIST OF ILLUSTRATIONS.

FIGURES SHOWING THE VARIOUS SUPERFICIAL MUSCLES OF THE BODY WHILE IN CONTRACTION.

FIGURES SHOWING MUSCLES IN DUMB-BELL EXERCISES.

APPENDICES.

PHYSICAL CULTURE:

SCIENTIFIC AND PRACTICAL.

CHAPTER I.

The Human Body is, without question, the most perfect, beautiful, and intellectual of all animal creations that nature has designed to work out her plans. But it has been the most abused, neglected, and despised. The most despised because it has been dragged to the lowest depths, and yet it is capable of being raised to inconceivable heights, so ennobling in character, so far-reaching in intellect, and so perfect in beauty, that when we pause and contemplate it for a while, we are astounded at the spectacle as it is often presented before us.

If we were given more to the examination

of this wonderful structure, we should better learn the particular uses for which each organ was intended, its structure, and mode of action. Of the hundreds of parts of which it is made up we should endeavor to become thoroughly acquainted, in order to know just how to protect it from the many dangers to which it is constantly exposed, and in case of accident, be a never-failing physician. We should keep ourselves at all times on the lookout to preserve health, that greatest of all blessings. This habit of vigilant observation sharpens our desire for subjects more intellectual, for purposes more moral, and has a tendency to develop in our natures a reverence for the vast works of a supreme hand, and an intellect so stupendous that we can only marvel at its magnitude.

It is the imperative duty of every man and woman to acquire such a knowledge of themselves as will enable them, in an intelligent manner, to minister to the myriad ailments to which this beautiful structure is exposed in all climes, and under all circumstances of mortal life.

There are ways innumerable by which we can improve the dwelling in which we live and have our being, and which we have insulted, abused, and allowed to degenerate in so shameful a manner, that instead of living all our days, we are dying all the time. Instead of growing stronger and healthier from childhood to manhood, the majority of mankind seem to grow more weakly and less healthful each day, until when the age of manhood is finally, if ever, reached, the sands of life have run very low, the three-score and ten years allotted to man on the earth seem very brief and transient, and the appearance of the vastly greater number of mankind at this stage of life, confirms the truth of the assertion. Man, at middle age, should be so endowed with physical force, brought about by his own efforts, as to be conscious that life has only just commenced, for in reality this should be true in a physical, mental, and moral sense. We all recognize the truth that the intellect is not fully developed until just before the decline of physical force has fastened his unrelenting grip upon us. I be-

lieve we should grow stronger and healthier each day until we reach the age of forty, and then hold that strength for a period of twenty years or more. This I believe was the design of nature. All other animal life that comes to our notice, not subject to the rule of man, give strong proof that such must be the case.

It is the aim of this work to put into the hands of every man, woman, and child a healing balm for physical ills that is neither disagreeable to take, costly to buy, nor impractical in its teachings, so that those who are at all inclined to better themselves physically, can most assuredly do so without the expenditure of very much time, money, or anxiety.

All parts of the human structure are so beautifully and harmoniously united, that no part can suffer injury without affecting all other parts to some extent; while the excessive use of any one organ, or set of organs, must be productive of injury to all others. The brain, for instance, can be so over-strained from a lack of supply of nutriment coming from an undeveloped physique, as to cause

the most serious results to the entire structure of the body; causing, for instance, insanity, nervous prostration, and many other ailments. Hence it is our duty, not only to ourselves and the laws of nature, but to our families, our friends, our country, and all that are dependent upon our efforts in every walk in life, to take care of this precious temple in which we live. We all live for, and are dependent on the skill and forethought of one another, and consequently should make every effort that lies within our power to improve ourselves in this direction.

I hope to see, in a not far distant time, when the schools of the country teach our little ones more of themselves, and not fill their tiny heads full of trash about Jack and Gill and such silly nothings, instead of teaching them to know that they have hands and feet, and how to use them to the best advantage, and how to take care of them; that they have stomachs, and how they must be treated and cared for, and what effects indigestible foods will have upon them; that they have muscles, and learn their actions and possibilities; and

so of the care of the eyes, the ears, the mouth—in fact teach them that part of human physiology that is of use to them now, and all through life. All this may, to some, seem silly and simple just now; but I believe the time will come when such education will become universal. And when that time does come we shall see a different race of men and women, physically and mentally, for the two are synonymous terms to a great extent.

Physiology, as it has been taught in our schools heretofore, has not been a very practical study; there is too much of it; to the average mind it becomes confusing in the course of the school term. There should be more different grades, commencing with the most simple and practical portions first in our primary school.

Of the hundreds of young and old to whom I have taught physical culture, I have not found one that was at all familiar with the actions of the various superficial muscles of their bodies; consequently they could not prescribe for their own weaknesses. And strange as it may seem, of the many physicians whom

I have taught, I have failed to find more than a very few that were not nearly as careless on this same point; while ladies, who really need to know the most about themselves, know much the least. I really believe that if ladies were aware of the terrible penalty which nature imposes on those who lace the abdomen tightly under the despotism of fashion, corset manufacturers would have to go in pursuit of another business.

I am sure children can become interested in this simple mode of education, if the right system is adopted for their use. I have had ample proof of this fact in my own schools, where I have had children from five years of age and upward, taking regular exercise, and at the same time learning something about the use of their muscular system.

Physical exercise, judiciously administered, and health, are synonymous terms. The more exercise of some kind—whether it be in the shape of labor, or in a prescribed course of training—that we take, the better health we may expect to enjoy, provided it stops short of exhaustion. The more we exercise, the

more breath we must have, and the more breath we draw into the lungs, the more oxygen we supply to the blood; the oxygen of the air purifies the blood as it passes through the lungs to the heart; and with purer blood, we are all aware, we must enjoy better health than when the blood is in a state of impurity.

CHAPTER II.

PURE AIR, AND FOUL AIR.

Every time you breathe, you breathe two different breaths; you take in one, you give out another. The composition of these two breaths is different; their effects are different. The breath which has been breathed out, should not be breathed in again. To tell you why it must not, would lead me into anatomical details. But this I may say: Those who habitually take in fresh air will probably grow up large and strong, ruddy, active, cheerful, clear-headed, fit for their work. Those who habitually take in the breath which has been breathed out by themselves, or any other living creature, will grow up—if they grow up at all—small, weak, pale, nervous, depressed, unfit for work, and tempted continually to resort to stimulants and become drunkards. If you want to see

how different the breath breathed out is from the breath taken in, you have only to try a somewhat cruel experiment, but one which people too often try upon themselves, their children, and their work-people.

To illustrate : I take any small animal, with lungs like your own—a mouse, for instance—and force it to breathe only the air you have breathed already. Put it in a close box, and, while you take in breath from the outer air, send out your breath through a tube into that box. The animal will soon faint, and if you go on long with this process, it will die. What becomes of this breath which passes from your lips? Is it merely harmful, merely waste? God forbid. He has forbidden that anything should be merely harmful, or merely waste, in this so wisely and well-made world. The carbonic acid which passes from your lips at every breath, is a precious boon to thousands of things of which you have daily need ; for, though you must not breathe your breath again, you may at least eat your breath, if you will allow the sun to transmute it for you into vegetables ; or you may enjoy its fra-

grance, or its color, in the shape of a lily, or a rose.

When you walk in a sun-lit garden, every word you speak, every breath you breathe, is feeding the plants and the flowers around you.

Listen to Rev. Charles Kingsley, on "The Two Breaths."

The following table (taken from Hutchison's "Physiology and Hygiene") shows the comparative amount of carbonic acid in the air under different conditions, and the effects sometimes produced.

Proportion of carbonic acid in 1,000 parts of air :	
Air of country	0.4
Air of city	0.5
In hospital well ventilated	0.6
In school, church, etc., fairly ventilated	1.2 to 2.5
In court house, factory, etc., without ventilation	4.0 to 40
In bed-room before being aired	4.5
" " after " "	1.5
Constantly breathed, causing ill health	2.0
Occasionally breathed, causing discomfort	3.0
" " " distress	10.0
Expired air (breath)	40.0
Air no longer yielding oxygen	100.0

Carbonic acid in its pure form is irrespirable, causing rapid death from suffocation ; air

containing forty parts per thousand of this gas (the composition of expired breath) extinguishes a lighted candle, and is fatal to birds. When containing one hundred parts, it no longer yields oxygen to man, or other warm-blooded animals, and is at once, of course, fatal to them; in smaller quantities this gas causes headache, and labored respiration, palpitation, unconsciousness, and convulsions.

In crowded and badly ventilated apartments, where the atmosphere contains relatively from six to ten times the natural amount of carbonic acid, the contaminated air causes dulness, drowsiness, and faintness; the dark, impure blood circulating through the brain, oppressing that organ, and causing it to act like a blunted tool. This condition is not uncommon in our schools, churches, and court-rooms, the places of all others where it is desirable that the mind should be alert and free to act. But, unhappily, an unseen physiological cause is at work, dispensing weariness and stupor over juries, audiences, and pupils. Another unmistakable result of living in and breathing foul air, is found in certain

diseases of the lungs, especially consumption. For many years the barracks of the British army were constructed with no regard to ventilation, and during those years the statistics showed that consumption was the cause of a very large proportion of deaths. At last the government began to improve the condition of the buildings, giving larger space and air-supply, and, as a consequence, the mortality from consumption diminished more than one-third.

The lower animals, also, confined in the impure atmosphere of menageries, contract the same diseases as man. Those brought from tropical climates, and requiring artificial warmth, generally die of consumption. In the Zoological Gardens of Paris this disease affected nearly all monkeys, until care was taken to introduce fresh air by ventilation, when it almost wholly disappeared. The tendency of certain occupations to shorten life is well known; as, for example, disease being occasioned by the fumes and dust arising from the material employed, in addition to the unhealthful condition of the workshop or factory where many hours are passed daily.

In ordinary breath-taking we consume but a very small part of the vital element contained in the air, which we call oxygen. When we are taking any kind of muscular exercise the contraction of the muscular tissues draws the blood more rapidly from the heart, causing us to breathe more deeply, thus supplying a greater amount of oxygen to the blood as it passes through the lungs. The oxygen is necessary to the purification of the blood after it has once passed from the heart through the arteries and veins into the lungs, where it comes in contact with the oxygen, and is purified, all ready for its reception in the heart again, since, as the blood passes through the lungs it changes carbonic acid gas for oxygen. Therefore, in taking exercise, we should be extremely careful to breathe as much fresh air and as little of our own breath, or anybody else's, as possible. If people would be more careful about breathing carbonic acid gas, there would be far less liability of catching what we term a cold. I believe what is claimed to take place when we catch cold is a certain change in the temperature of the

body—a lowering of it. I think, perhaps, in ninety-nine cases out of every hundred, that when persons claim to have taken cold, they have not taken cold at all, but that it is simply the effects of the poisoning of the mucous membrane of the air-passages, from breathing foul air. I have myself, while sleigh-riding in the winter season, had the temperature of my body lowered to almost freezing, and yet I have never taken cold from this cause; and I have known cases where men have actually frozen both feet and hands, and yet did not suffer from a cold in the head, throat, or lungs. How is this? Will not some of our scientists on this specialty enlighten us on the subject? The only time I ever seem to catch cold is when I breathe the terribly poisonous air of a crowded theatre, or when I happen to sleep in a small room with the window shut, thus breathing my own breath over and over again, which very rarely ever happened to me till last winter, and this I will explain, for I think it will go a long way toward bearing me out in the statement that breathing foul air does more injury by creat-

ing colds than is caused by lowering the temperature of the body.

In the month of February, 1885, I had a very severe attack of blood-poisoning, which settled in my bronchial tubes. I had some trouble with it the following autumn, and I determined to be very careful the coming winter, lest I should add to my trouble by taking more cold. So, when the weather became a little colder, I closed my windows at night (something that I had not been in the habit of doing, at least since I had taken up the study of physical culture nine years previous) for fear that the night air would have the effect of increasing the inflammation in my bronchial tubes. I do not think that more than a week passed before I had contracted a cold. At first I did not think much of it, but was still more careful, if that were possible, and yet I seemed to keep catching more cold, for each week appeared to add a little more to it, until finally, about the last of February, 1886, it turned to neuralgia, and I had severe pains in the head, and the worst cold I had ever experienced. This state of

things finally brought me to my senses, and I said to myself, something is radically wrong about this being so careful of one's self. But when I came to reason, I found I was careful in the wrong way, and that was of not letting the poisonous air escape from my room while I slept. I found I had been doing just what I had for years been preaching against in the most emphatic language. I finally resolved to go back to my old practice of sleeping with my windows open, and I declare that I had not slept so more than five nights before every vestige of a cold had vanished so completely that I should not have known that I had ever been troubled with such a misfortune.

From thenceforth the two windows in my sleeping apartment have been kept wide open, day and night, wet or dry; and I have actually, in getting up in the morning of a rainy night, found my clothing so damp that it felt wet to the touch. But it was put on all the same, and from March first to this date I have not had the slightest sign of a cold, although I commenced the practice in the spring

of the year, which is supposed to be the worst season for colds and sore throats. I am convinced that it proves to be the worst time of the year for these ailments only from the fact that in such disagreeable weather people shut themselves up closer, and thus breathe a greater proportion of foul or poisonous air than when the weather is more pleasant.

I mention this incident with the hope it may be the means of opening the eyes of thousands, whom, I am sure, suffer from the same cause. If this were all the ailment to be caused by breathing foul air, it would not be so bad; but such ailments actually lead to worse, even to diseases of the lungs, and various other forms of consumption.

You should have at least one window wide open in the winter season. You say it would make the temperature of the room too cold to sleep in. No, not so. If you would keep a little hotter fire, the extra cost for keeping the fresh air warm for you to breathe in cold weather, it would not amount to half the cost of a doctor's bill, and besides, you have the pleasure of living without feeling half dead at

the same time. You can easily do this, and I am sure of the beneficial results, for I have tried the experiment on myself, and know whereof I speak. A plenty of fresh air will cure a cold as quickly as anything that you can take. You must have noticed many times that when you rose in the morning your cold was always worse than after you got into the air; and also, that it is always better when out of doors. The reason is obvious enough if you will look at things in a reasonable light.

Exercise will oftentimes be the means of throwing off, or warding off, a cold, if it be judicious exercise for the lungs as well as the muscles; for the oxygen of the air, if it be bountifully partaken, contains the properties for strengthening and toughening the mucous membrane of the air-passages. But no amount of judicious exercise will keep one from catching what we term colds, but what I believe in reality is nothing more nor less than the poisoning of the mucous membrane by the foul gases contained in the air we breathe. If this were not so, why should a cold always

show itself in the air-passages of the nose, throat, and lungs? It seems to me that if a cold were brought about merely by the lowering of the temperature of the body, then why should we not be as liable to catch cold in our feet, our hands, our legs, or our arms, since the temperature becomes much lower in those particular parts than in any others, as we would in the throat, head, or lungs? I am fully aware that at times contracting a cold in some of the air-passages is liable to affect other parts of the body through sympathy.

But as this is designed to be merely an instruction book for those who are in need of physical exercise, I will refrain from further comment on this subject.

CHAPTER III.

QUESTIONS CONSTANTLY BEING ASKED.

As I wish to make this book as instructive as possible, I will now proceed to answer a few questions that almost daily come up in my profession. I will endeavor to answer these inquiries as plainly as possible, and according to the teachings of my experience and studies which have been quite varied.

QUESTION NO. 1.—DOES MASSAGE TREATMENT DEVELOP AND STRENGTHEN MUSCULAR TISSUE?

The benefits to be derived from the treatment of massage, more especially in the pelvic (abdominal) region are very great. If the manipulator be intelligent in his work, the treatment of massage is just as much a matter of science as is the development of the muscular tissues. The benefits derived from this

treatment are not wholly confined to the abdominal region, though this is where the chief advantages can be had. For ailments such as constipation and indigestion, it is, without a doubt, a splendid remedy. It is also very good in some cases of muscular rheumatism. I have always thought it an excellent temporary tonic, and in those special ailments I have spoken of, I think oftentimes it effects a cure. I think massage treatment is of very little use in cases where physical degeneracy is the cause of certain conditions in the health of an individual. I believe it is an utter impossibility by the massage treatment to bring about a development of muscular tissue which is compatible with the longevity of a healthy condition ; for the contraction of the muscular tissue is necessary to its development, and in the practice of massage the patients do not bring their muscles into contraction ; they only lie still to have the afflicted or weakened parts worked over by the hands of the manipulator.

QUESTION NO. 2.—ARE BOAT-ROWING AND HORSEBACK RIDING GOOD EXERCISE?

In nearly every sense of the term, boat-rowing and horseback riding are excellent exercises. They lure us into the fresh air, and cause us to take long, deep inhalations of that life-sustaining beverage, pure, fresh air, and that most healthful of all healthful influences, the sunlight, which most people, especially ladies, shudder at the very sight of, under the false impression that the complexion will suffer from contact with it. This is a very false idea, for sunshine improves the complexion and health of mankind, the same as that of plants. We all know that if we keep a plant in the house, away from the window, where the sunshine cannot reach it, that it will grow up slender, pale, and sickly; while those plants that are kept close to the window grow up strong, large, healthy, well developed, and of a fine color. Hence, if you cannot get out of doors for air and sunlight, open the windows of your rooms and let the sunlight in.

Never mind the fading of the carpets or furniture, for it is much cheaper to buy carpets and furniture than to pay for medical attendance, and much pleasanter to pay a bill when we are well than when we are in poor health. As I write these words, I am sitting directly in the sun with my hat off, and have been for hours. Of course I shade the manuscript while writing, to keep off the glare of the sun.

The thermometer now registers over ninety in the shade; and although every one cannot stand so much sun, yet, after getting accustomed to it as I have, you can do so. I oftentimes think it is not so warm in the sun as in the shade; at least it is not so depressing for me to sit in the sun as it seems to be to others in the shade.

But if I appear to be wandering from the text, the excuse is that I am so anxious to say all I can to induce my readers to think more seriously on this subject of good health. I also think that where the writer can speak from experience, his words are more apt to carry conviction to the reader.

Boat-rowing and horseback riding, I have

said, are in many respects excellent exercises; but, like almost all exercises that are not for a special purpose, they have their objections. Boat-rowing, while it will develop some parts of the body excellently well, invariably cramps the chest, especially if you pull a scientific oar. You can obviate this result if, when you pull the stroke, you will brace the chest well forward at the last part of the stroke; make an extra effort to do this each time, and you will do the chest much good, for this robs the exercise of its worst objection. This action of the chest would not do if you wished to row swiftly, as it costs a waste of time.

Horseback riding for ladies has its special dangers; they are liable to be thrown, and receive injuries to which gentlemen are far less exposed. Another objection is raised to this exercise, especially for ladies with a weak spine—a very common case. It is quite possible to induce a lateral curvature of the spine, because of the side position taken by the rider. Her spine is curved laterally the whole time, and always on the same side. If every other

time a lady should sit on the opposite side of the horse, this danger would be avoided. Horseback riding is good for those who can stand a little shaking up, and more people need it than they are aware of. It sends the circulation to the stomach and abdominal regions, where it is greatly needed, particularly by persons of sedentary habits. The benefits thus gained, however, are, I believe, but temporary in the great majority of cases. The trouble is, in the first place, a lack of energy from a corresponding lack of physical or muscular development. Horseback riding cannot *create* development, because the rider is not called upon to use the muscular powers, unless you have a very vicious horse to handle; then if you are able to stand an hour or two each day, you can get a splendid development from the exercise, if taken in time. But not one person in five hundred will ride a vicious horse; hence the lack of physical development to be derived from the practice. It is simply a splendid temporary tonic, and a very enjoyable one.

QUESTION NO. 3.—ARE ATHLETIC SPORTS CONDUCIVE TO HEALTH?

Athletics, or field sports, are certainly very conducive to development and health, if practised in moderation, and with that end in view. But when they are entered into in the spirit and act of contention, and fierce struggle, they are the worst of all exercises. Instead of building up the health of those who take part in them, they literally tear it down, and I earnestly believe shorten life, many years for some. If physical culture means health and longevity, why do men that are noted in athletics always die young?

The very fact that they are noted athletes is sufficient proof that they have participated in many athletic contests, and this generally means: "Good boy Jack, pull (or run) till you drop; don't let him beat you; I have put my last dollar on you;" and the poor fellow strains every nerve, and comes in staggering from the excessive strain. What does this mean? It means most assuredly that he

has shortened his life by the operation, we cannot say how much. We cannot doubt this, when we read in the papers every season of some of them too early laid in the grave. It has been their misfortune to be overtaken by the laws of nature much sooner than their companions. But just so sure as only a few may meet with death directly traceable to the effects of such violent contests, just so sure will you, who are apparently none the worse for it at the present time, meet with a premature death.

Such proceedings should not be called physical culture, but death culture. The true meaning of physical culture is to build up, not to tear down.

Athletics, as they are participated in at our colleges, should be universally condemned. I do not think that more than five per cent. of the students of our colleges that have a gymnasium ever take any exercise in it—at least not enough to do them any good—unless we except the one or two in which the practice of physical culture is made compulsory, as it should be made in every school

and college in the land, and supplied with instructors understanding the science of physical culture. Athletics, such as running on foot, rowing a boat, swimming, riding a bicycle, and climbing up mountains, are excellent exercises for regulating the health if they can be participated in until you are fairly tired, and then rest until you have recovered your strength again—with a little more added, if you use reason in your exercise. Swimming is, I think, the best of all the exercises that come under the head of athletics.

QUESTION NO. 4.—WHY DO YOU OBJECT TO DEVELOPING WITH HEAVY WEIGHTS?

Development brought about from the use of heavy weights, in my opinion, is injurious to health, and is incompatible with longevity. The use of heavy weights will develop power in certain persons to a considerable degree, but not so much so as light weights. Heavy weights will not leave the muscles in that state of suppleness as the use of light weights. Heavy weights will make the muscular tissue

rigid and stiff to the touch, while light weights leave the muscles soft, but firm, when in repose; but if there has been any great degree of strength reached, the contraction of the muscles will make the flesh feel as hard as a stone, but immediately on relaxing the muscle the flesh will feel very soft and pliable, thus leaving it quick and supple in its actions. Not so with muscles developed by heavy exercise; for even when in repose they will feel hard to the touch. They cannot move quickly. It is as impossible as for the cart-horse, who has always been hitched to a heavy load, to make as quick a movement as the trotting horse, that has been developed by light, quick exercise.

The injury from the use of heavy weights is little understood or thought of. It is brought about by the muscular tissue being thus hardened from the development of what is known as the connective tissue—meaning by that the connecting together of the bundles of muscular fibres by a substance of a tendonous nature, thus rendering the muscles stiff and hard even when not in a state of tension. This

condition of things prevents circulation from taking place as freely as if the muscles were so developed as to leave them in a more pliable state.

One still greater objection to the use of heavy weights, or heavy gymnastics, as a means of physical exercise, is the ever increasing liability of straining some part or parts of the system, that may last a lifetime. The fact is, heavy gymnastics are going out of date. People are looking into the matter now in a more intelligent manner. The extreme of light weights (calisthenics) is also losing favor, and a happy medium is being adopted to gain the best and most speedy results.

QUESTION NO. 5.— HOW LONG A TIME WILL IT TAKE TO DEVELOP A MUSCLE TO ITS LIMIT?

It is so seldom this is done, that it is perhaps, to many people in the profession, a hard question to answer. My experience has, I think, given me a right to answer this question, at least to give my version of it.

Some of my own muscles, such as the bi-

ceps of the arms, were developed to their limit in about two years; but most of the muscles of my body were three years in being developed to a state of perfection. The reason for taking a longer time to develop some of them was, that those muscles which are used most in our daily occupations (provided that they are not used so much that they become exhausted), and take the same amount of prescribed work, will be likely to develop in a much shorter time than others.

You may ask, how is it possible to give each muscle of the body the same amount of exercise, when some can stand double as much as others? The only rule to be guided by is to exercise each one until it is tired. I have also noted this same effect in some of my pupils that were faithful in their exercises. I feel confident that it is possible, for anyone between the ages of twenty and forty, to develop every muscle in the body in three years of faithful work, if they have no constitutional disease to prevent it. Growing children cannot reach the limit of muscular development, until after the period set by nature for the

natural growth. If exercise be commenced in childhood, the development at the age of twenty-one will be much greater than without the exercise, unless we except a very few instances where nature, without artificial aid, completes the work. It is not often you find persons in whom you can awaken interest enough in their physical condition to make them exercise an hour faithfully each day for three years, and thus gain perfect physical development and health. This is the price that must be paid, if you wish to become physically a perfect man or woman.

QUESTION NO. 6.—IS THERE A LIMIT TO MUSCULAR DEVELOPMENT, AND IS IT POSSIBLE TO REACH AN ABNORMAL DEVELOPMENT?

There is a limit to the development of the muscular tissue, as much as there is a limit to your stature, or a limit to anything else. Otherwise, the blacksmith, for instance, who follows the same business for twenty or thirty years, would become as broad as he is long, and have muscles hanging to him as big as

his head. The laws of nature stop short of all this, and allow the development of the muscular tissue to go on until the highest point of beauty has been reached, and the most graceful outlines appear, and there it must stop. The same amount of exercise taken to reach this point will do no harm to keep on. But you must not try to force a greater development, by increasing greatly the amount of exercise, or you would be very liable to suffer from that condition known as atrophy of the muscular tissue, which means its wasting away, leaving scarcely anything but the tendons.

I recall now a case of this kind, that happened in Springfield, Mass., eight or nine years ago. A young man of good proportions took to practising with dumb-bells, and developed splendid biceps muscles. He joined a club of young men athletically inclined, and they were going to make something wonderful of him. He set to work "with a vengeance;" the result was that atrophy shortly set in, and the biceps muscles of both arms wasted so completely away, that he had

hardly strength enough left to bend the elbows.

I believe this waste of the muscular tissues can never be completely repaired. It is not possible to acquire an abnormal development of the muscular tissues; as has been before stated, it can only reach to the highest point of beauty and grace; or perhaps, in speaking of the development of the male sex, it would be more proper to say, to the highest point of grandeur; for I think beautiful should be applied to the development of woman, and grandeur to that of man. There is, however, what could be termed an abnormal development of muscular tissue, but which may be brought about by accident of some nature. Such conditions are properly termed freaks of nature, which have no affinity with fixed laws. It is also possible to find certain muscles so much better developed than others, that they appear to be abnormally so; but the ugliness, on close examination, can be traced to the undeveloped muscles, instead of the over-developed ones.

QUESTION NO. 7.—WHAT IS MEANT BY BEING MUSCLE-BOUND?

Muscle-bound is a term that is often wrongly applied. It is a common impression that when a person's muscles have been brought to a high state of development, they must be muscle-bound. This is not necessarily the case; in fact, muscle-bound is a condition as prevalent among people that are not specially developed as among those that are. I notice that generally, when a well-developed man cannot perform certain contortions with his legs or arms, it is at once said (by the great majority who know nothing about it) that he is muscle-bound; while a man without any special development, failing to perform the same feats, is called stiff-jointed, which is right. The tendons are so stiff and unwieldy that he has failed to accomplish tricks that need only supple joints to perform. The well-developed man failed for the same reason as the other, namely, stiff tendons. Perhaps this condition was natural with him, or it may

have been brought about by exercising with heavy weights, or from heavy labor, thus stiffening and contracting his tendons. But not because of his superior muscular development.

Then there are other conditions possible, why one man would be able to perform contortions that another could not. For instance, some men can touch the backs of their hands together behind them, while others cannot; one may have very narrow shoulder-blades and shoulders, which will allow the arms to go back without much effort; another may have very broad shoulder-blades and shoulders, which render it impossible to get the hands together back of the shoulders, without forcing the humerus (bone of the upper arm) out of the socket at the shoulder-joint; for the shoulder-blades being very broad, will meet and prevent the arms from moving further back. Many would say that this failure of a well-developed man was because he was muscle-bound. The meaning that muscle-bound conveys is inability to perform certain feats of contortion, but the term should never be

applied to the muscles, as the muscles in no way interfere with the performance of such feats. It is due to the conditions above stated, and the inelasticity of the tendons about the joints, caused by developing muscular tissue through the use of heavy weights, or heavy gymnastics, which make the tendons stiffen and contract—that is what is termed muscle-bound. Light-weight exercise will never do that. But if you are loose-jointed (and so become liable to injuries) that exercise will draw the parts firmly together, by increasing the tonic contraction of the muscles without bringing great strain on the tendons.

QUESTION NO. 8.—WHY ARE SOME SMALL MEN MUCH STRONGER THAN OTHERS NEARLY DOUBLE THEIR SIZE, AND DEVELOPED PROPORTIONATELY?

This question puzzles many people. It is a fact that some small men are much stronger than much larger men, with a better development of muscular tissue. Of course, the

larger the muscles (not the man) the greater the power, everything else being equal. This is where the difference comes in. Everything is not equal; that is why the smaller one is stronger than the other. The principal difference is probably in the attachments of the muscles to the bones, which are the levers to be operated upon. Nearly all weights that are raised or lifted in any way by man, are so lifted by the contraction of muscles which have tendons so attached to some bone near some joint as to cause a movement of the joint. I will endeavor to explain as clearly as I can.

We will take for example the biceps muscle of the arm. The tendons of the biceps muscle at its lowest point are attached to the radius (bone of the forearm in front) very near to the elbow-joint, and about two inches from the end of the radius. We will say that it is ten inches from this part of attachment near the elbow-joint to the centre of the palm of the hand. Now, when the biceps muscle is in contraction, it pulls on the tendon which is attached to the bone of the forearm,

thus raising the forearm and the hand, with whatever weight may be in it. From this you can see that the biceps muscle has a leverage of ten inches to overcome. Now, suppose that the biceps had only nine inches to overcome, you can see, of course, that one inch less of leverage to overcome would admit of the biceps muscle raising a much heavier weight held in the hand. Now this, I claim, is one of the many reasons why we find some small man able to perform some feats of strength which another man nearly twice his size cannot. The attachments of the muscles may be longer or shorter, as the case may be, thus gaining or losing an advantage over another; while the small man, as a rule, has the advantage of smaller leverages to overcome, the larger man has the advantage of a greater bulk of muscular tissue; hence, a greater proportion of power to overcome his longer leverages. The rule is, the larger the man (because of the larger muscles) the greater the power. But there are, as a result of various conditions, a great many exceptions to this rule. Some men may have as large muscles

as others and much less power, because of not being in such good condition. Then again, you may take two men, one much smaller than the other, with a small bony structure, and a very large muscular development; the other with a large bony structure and a very small muscular development; and you will almost invariably find the smaller man the stronger of the two. His muscles may not be in any better condition than the other one's, but he has more bulk of development, consequently greater power.

QUESTION NO. 9.—WHY IS A PERSON TALLER, AND WEIGHS LESS, IN THE MORNING THAN IN THE EVENING?

It is a fact that we are nearly one inch taller in the morning, just after rising, than we are in the evening, and also that we are from one and a half to three pounds heavier at evening than in the morning.

I suppose why we average so much heavier at evening is, that during the hours of sleep the weight of the body is lowering from the

loss of heat and gases that are being continually eliminated through the pores of the skin and from the lungs, while there is nothing of consequence being added. This process of elimination is also continued through the day, and to a much greater extent than at night; but during the day we take into the system, in food and drink, on an average, about six or seven pounds, when in good health. (See Question No. 12. The food we eat.)

The reason why we are taller at morning than at night, I will try to explain. The spine (backbone) is divided into thirty-three parts which are called vertebræ, and between the greater number of these there is a cartilaginous-like substance attached to each one, forming, as it were, a cushion for the vertebra to move upon. Now, during the day, whether standing or sitting, this spinal column has to support the weight of the body above the hips. This substance between the vertebræ is, I have said, of a cartilaginous nature, or perhaps I might say, of a gristly nature, elastic like india-rubber. The constant pressure of the

weight of the body upon the spinal column, for fourteen or sixteen hours, compresses this gristly substance and flattens it; now, if there were about twenty-four of these cartilages, and each one was flattened a twenty-fourth of an inch, you see at once that it would make an inch difference in the length of the body. While we are lying asleep there is no weight on the spinal column, and consequently the cartilages thicken again and assume their natural condition, thus making the body measure longer in the morning than at night. The heavier the body the greater the difference will be. In very muscular and active people, the difference is less, for the active one will partly hold the weight of his body up in the endeavor to carry himself erect.

QUESTION NO. 10. — HOW SHOULD A PERSON BREATHE WHEN RACING, AND WHILE WALKING UP-STAIRS, OR UP-HILL?

In racing you should take the breath through the nostrils as long as you can, for if there are foreign substances in the air, it is better that

they should stop in the nostrils than in the throat. If you are racing very hard, it is impossible to take a large enough volume of air through the nostrils, then you are obliged to take it in through the mouth. Most racers are continually troubled with dryness of the throat when they take breath through the mouth; the reason is because of the defective way they have of opening the throat to let the column of air pass into the lungs. They take it in in such a way that the column of air strikes against the back part of the throat, thus causing dryness and irritation of the mucous membrane lining of the mouth and throat. A good exercise to teach you how to hold the throat while taking in breath, will be found in Exercise No. 1, for the control of the vocal muscles; Exercise No. 2 for the practice of deep breathing,

In racing you should make an extra effort to take in a deep draft of large volume at each inhalation. You will thus hold out longer than you would by simply drawing in just the amount that you would naturally. You must remember that we do not always breathe to

the best advantage without cultivation, any more than we do many other things. Take, for instance, walking, which is just as much a natural attribute as breathing. We can all walk, but how much better can we walk if we go into training. We can improve in endurance, in quickness, and in grace by cultivation.

I make this statement because I am aware that there are those who claim that in racing, or in fact in muscular efforts of any kind, all you have to do is to go right along, and take no notice of your breath, for nature will take care that it is supplied as fast as it is needed, and to the best advantage. Now, I do not believe nature will do this, any more than she will supply us with health to the best advantage, without cultivating it. Nature merely makes it possible for us to do better, and aids us in our efforts. In walking up-stairs, you should pitch the body well forward by bending it at the hips, and make an effort to take in a little extra breath. By doing this, you will find, when you get at the top of the stairs, that you will not have to gasp so for breath, and be "all out of breath," as you call it.

There is just as much air around you as you can use, and all you have to do, when making extra efforts with your muscles, is to make extra efforts with your lungs at the same time, and you will not have to puff so. When walking up hills or mountains you should pitch the body well forward, and you will find that you can walk much farther, faster, and with much less fatigue; for if the body is pitched far enough forward, it will be pushed up by the legs, and relieve the strain from the stomach. If you are not pitched forward, the body is pulled up, which is much harder than for the same muscles to push; and then there is considerable of a strain brought to bear on the abdominal muscles, which is very tiring.

QUESTION NO. 11.—IS THERE ANY ADVANTAGE GAINED BY WEIGHTING THE SHOES OF FAST RUNNERS, AND HORSES?

As I understand it, the shoes of fast runners are weighted, because they think that they thus gain an advantage. The advantage that is claimed, is that, when after practising

with weighted shoes just before the race, and then at the time of the race take them off and wear as light shoes as possible, it is said that the sudden change from heavy to light will cause the racer to feel a sudden lightness, and make better time in the race, than he would have done if he had worn the light shoes all the time in practice. I think this result from weighting shoes is a mistake. I believe that, just so true as using heavy weights will cause the muscular tissue to contract slowly (and this is a fixed law of nature), that just so sure as the sprinter will adopt this method of practice, so sure will he run a slower race; for it is the contraction of muscles in the legs that propels the body, and once made to contract slowly from use and habit, the quickness cannot be regained at once. To be sure, there is a feeling of relief after discarding the heavy weights and adopting the light ones, and one does feel that he can make quicker efforts. But I believe this is a delusion. The trained muscle cannot make the change of action as quickly as the change can be made from heavy to light weights.

It is a very easy matter to prove this to yourself if, for instance, you will take a pair of dumb-bells of weight light enough for you to make about one hundred movements with them in a minute, by curling with the biceps muscles; make the movements as fast as you can, count how many you can make in a given time; then practise with bells twice as heavy for a week or so, and then try the first ones again to determine if you have lost or gained in quickness. If the horse's feet are weighted for the same reason that the sprinter's shoes are, then, of course, like results must naturally follow.

I had one pupil in my school in Worcester, a few years ago, who was an example of what heavy weights will accomplish in the way of making the muscles act slowly. He had at home, for seven or eight years, been practising to pull himself up so that his chin would pass above a bar which he grasped with his hands. When he came to me, he could perform this feat thirty-five times in succession, which is a very large number. He also practised for the same length of time another feat

called "dipping," which consisted in placing two chairs, one on each side, with their backs nearest to him, and then placing his hands on their backs, raise his feet well up from the floor and letting himself down between them till his knees touched the floor ; then, raising himself by his arms to the first position, keeping the feet clear from the floor. He performed this feat thirty times in succession. This work, practised so long, had made his muscles so slow acting, and stiff, that he could not strike but about thirty blows with his arm in the same number of seconds, while an ordinarily quick man will strike about one hundred blows in the same time. The muscles that were used in striking the blow were the same that were used in his heavy exercise, namely, the biceps, that crooks the elbow, the triceps, that straightens it, the pectoral of the chest, the anterior deltoid, that extends the upper arm, and the latissimus dorsi—all these muscles being used in striking and recovering, and also in the two feats in which he excelled.

QUESTION NO. 12.—WHAT KIND OF FOOD IS BEST FOR US TO EAT?

In answering this question, I think I can best serve my readers by appending a few lines from the works of several authors on this subject.

The Waste of the Body.

"In the physical life of man there is scarcely such a thing as rest—the numberless organs and tissues which compose his frame are undergoing perpetual change, and in the exercise of the function of each, some part of it is destroyed. Thus, we cannot think, feel, or move without wasting some proportion, great or small, according to the energy of the act of the apparatuses concerned, such as brain, nerves, or muscles. Now, this waste-product cannot remain in its original situation, where it would not only be useless dross, but also obstructive and injurious. Such old material is being daily removed from our bodies to the average amount of three or more pounds; and that an equal quantity of new shall take its place is the first principle of alimentation. To express it in commercial language, the income must be equal to the expenditure; and in each of us the amount of this exchange

must, in a lifetime, reach many tons. This tissue change is so complete, that not a particle of our present body will be ours a short time hence; and we will be, as I have lately seen it phrased, like the knife which, after having had several new blades, and at least one new handle, was still the same old knife to its owner. We are, in fact, constantly 'moulting.'"—*Mapother's Lectures on Public Health.*

A Daily Ration for an Adult Man.

"We may arrive at something like an average daily diet in taking the case of the man in good health, weighing 154 pounds, and measuring 5 feet 8 inches in height. Simply to maintain his body, without loss or gain in weight, his ration of food should not contain less, during 24 hours, than the following proportions and quantities of the main ingredients.

The Average Daily Diet for an Adult.

Food Substances.	Percentum.	Weight.		
		Lbs.	Oz.	Grs.
Water	81.5	5	8	320
Albuminoids, or flesh-formers	3.5	..	4	110
Starch, sugars, etc.	10.6	..	11	178
Fat	3.0	..	3	337
Common salt	0.7	..	..	325
Phosphates, potash, salt, etc.	0.3	..	..	170
	100.0	6	13	128

"Water, it will be remembered, enters into the composition of every article of food, as well as in the liquids we drink. In reality, the weight of the dry food we take will exceed that given above; chiefly for the reason that they do not come to us pure and unmixed with fibrous material and gelatine, whose use in nourishing the body is limited and uncertain."—*South Kensington Museum Handbook on Food.*

Different Effects of Animal and Vegetable Food.

"Raw meat gives fierceness to animals, and would do the same to man. This is so true that the English, who eat their meat underdone, seem to partake of this fierceness more or less, as shown in pride, hatred, and contempt of other nations."—*De La Mettrie.*

"The carnivora are in general stronger, bolder, and more pugnacious than the herbivora on which they prey; in like manner, those nations who live on vegetable food differ in disposition from such as live on flesh."—*Liebig.*

A bear at Giessen was very gentle when fed on bread, but a day or two on meat made him savage and dangerous.

"The hunted deer will outrun the leopard in a fair, open chase, because the force supplied to its muscles by vegetable food is given out continually for a long time; but in a sudden rush at a near distance, the leopard will infallibly overtake the deer, because of its flesh food stores up in the blood, a reserve of force capable of being given out instantaneously in exceedingly rapid muscular action." —*Haughton's Animal Mechanics.*

A Summary Concerning Diet.

"The food on which the man who would be healthy should live, should be selected so as to insure variety without excess. Animal food should not be taken oftener than twice daily. The amount of animal and vegetable food, combined, should not exceed thirty ounces in the twenty-four hours; and for the majority of persons an average of twenty-four ounces of mixed solid food, a third only of which should be animal, is sufficient. All animal foods should be eaten while they are fresh, and after they have been well cooked. The habit of eating underdone flesh is an almost certain cause of parasitic disease. The amount of fluid, taken in any form, should not exceed the average of 24 ounces daily. Water is the only natural beverage."—*Dr. B. W. Richardson on Diseases of Modern Life.*

Cooking Paves the Way for Easy Digestion.

"The objects to be obtained by cooking meat are:

"1. To coagulate the albumen and blood of the tissues, so as to render the meat agreeable to the sight.

"2. To develop flavors, and to make the tissues crisp as well as tender, and therefore more easy of mastication and digestion.

"3. To secure a certain temperature, and thus to be a means of conveying warmth to the system.

"4. To kill parasites in the tissues of the meat.

"The action of heat should not be continued after these objects are accomplished, as the meat will thereby be rendered indigestible. If a piece of meat be placed in water which is briskly boiling, a crust, so to speak, is formed by the rapid coagulation of the albumen upon and near the surface; so that the juice of the meat cannot escape, nor the water penetrate its interior. If, on the other hand, the meat be put in cold water and slowly heated, the albumen is gradually dissolved and exudes into the water, making good soup, but leaving the meat poor and tasteless. Even in roasting meat the heat must be strongest at first, and it may then be much reduced. The juice which, as in boiling, flows out, evaporates, in careful roasting, from the surface of

the meat, and gives to it the dark-brown color, the lustre, and the strong aromatic taste of roast meat. All baked and roasted fatty foods are apt to disagree with delicate stomachs, and it is often remarked that, although bread and butter, boiled puddings, boiled fish, or boiled poultry can be eaten freely without discomfort, yet toast and butter, or meat pies and pastry, or fried fish, or roasted fowl will disagree with the stomach."—*Letheby on Food.*

I have always followed the rule that the food which seems to agree best with my stomach is the best food for me, and I suppose this same rule will apply to all. I think if we are at all observing, we know pretty well what foods agree with us best.

QUESTION NO. 13.—WHAT FORM OF BATHING IS BEST?

There are many different modes of taking a bath. I think the most healthful is to take a good sponge, plenty of cold water, and good soap; rub the body over first with your sponge well soaped, then rinse out the sponge well, and apply it with clear water to the

body, again cleaning off all the soap, and then rub the body perfectly dry with a coarse towel. It is always best, before taking a cold water sponge-bath, to first get the body well warmed up by taking a little vigorous exercise of some kind; then the water will not seem so cold to you; and while applying the sponge, if you will do so vigorously, the act itself will warm you up, and besides serve as a good exercise. Cold water will leave the skin in a much better condition than warm water; then, too, after an application of cold water to the body, there is always a sense of buoyancy felt, while on the contrary, after a warm bath, one is apt to experience a sense of dulness and sleepiness—although, even if taken before retiring for the night, I think a cold bath will be productive of a better night's rest than a warm one, for I think a warm bath after a time produces nervousness. It is a very good idea to drop a little salt in the water in which you are to bathe, as it is very strengthening and cleansing to the skin.

A Turkish bath is a splendid thing *once in a while;* but my advice is to keep out of the

cold plunge, as I believe the injury from so sudden a shock more than counteracts the good results gained from the rest of it. The cold shower is much better, if not very cold to you, for you must judge for yourself. Water of a certain temperature will feel much colder to one than to another, according to the vigor of the system.

QUESTION NO. 14.—HOW CAN I BEST REDUCE MY WEIGHT, AND HOW INCREASE IT?

The weight of a person troubled with too much fat can be reduced by taking a very large amount of exercise daily. It can also be reduced by dieting. It can be done by running, I think, much sooner than by any other mode of exercise. The great majority of fat people object to dieting as a means of reducing bulk, and, also, in most cases it is not convenient to take a run of a few miles each day, as it takes considerable time both in the preparation and in the act. There may not be a convenient place near at hand, if one have the inclination to indulge in this method.

The best in-door method of exercise that I know of for reducing weight is (if you have the strength to stand it, as few ladies have), to exercise each set of muscles of the body twice a day in a very vigorous manner, so as to make yourself perspire as freely as possible. The method of exercise which I would prescribe is the one given in this book as the most efficient, for there is work for every part, and the greater number of the parts that are exercised, the greater the amount of perspiration thrown off; hence the greater reduction of weight.

You must remember that if you wish to reduce weight by exercise, you will have to work very hard for about an hour or so twice each day. You can reduce much faster, and with half the amount of work (this applies to ladies as well as gentlemen), if you will wear an air-tight rubber suit (made for the purpose) while performing the various exercises; the heat being thus retained, the more you will perspire.

If you are thin, and wish to increase your weight, then all you have to do is to exercise

judiciously, vigorously, and faithfully, and thus increase the bulk of the muscular tissue. If you think you are just about of the right weight, and yet need exercise for the benefit of your health, you need not fear that you will lose weight from vigorous exercise; it is only the very fleshy ones that lose from taking exercise.

QUESTION NO. 15.—CAN YOU DETERMINE THE SIZE OF ONE'S LUNGS BY BLOWING IN A SPIROMETER?

You cannot determine the size of anyone's lungs by measuring the air which is exhaled from them, for there is always a residuum of air left in the lungs after you have blown out all you can. About the only truth which you can get from the use of a spirometer is whether one has exhaled more than another. My experience has been that, all other things being equal, the man with a flat chest will blow out more air from his lungs than the round, full-chested man, and very much more at that. I think the reason of this is, that the

flat-chested man can contract the walls of his chest so that the front wall will approach the back wall much nearer, and thus squeeze out more of the air from the lungs.

The round, full chest cannot flatten as much, but when it contracts will hold its rounded form on account of the bowed shape of the ribs, and hence cannot press the lungs so flat as the straight ribs can.

Blowing in a spirometer is a splendid practice for enlarging and strengthening the lungs, if the one performing it will not go to extremes in using force, in order to gain more rapidly. If going to extremes is persisted in, much harm may accrue.

CHAPTER IV.

PERSONAL EXPERIENCE OF THE AUTHOR IN PHYSICAL TRAINING.

I THINK now, while I am in the spirit of it, that I had better relate something of my own experience in developing myself physically, for it will serve to illustrate my system, and may encourage others.

I began to take special exercise in the fall of 1877. The first year I worked about in the gymnasium in an indefinite manner, with no instructor to guide me, as there should have been. If I had not taken a deep interest in the subject, I am sure I should have become discouraged by the result of my first year's experiment. But I was resolute enough to go on, and I commenced the study of the matter in an intelligent manner, and with the most pronounced success. I was twenty-three years old and weighed one hundred and thirty-eight pounds after my first

year's ineffective work. But when I commenced to exercise in a systematic and scien-

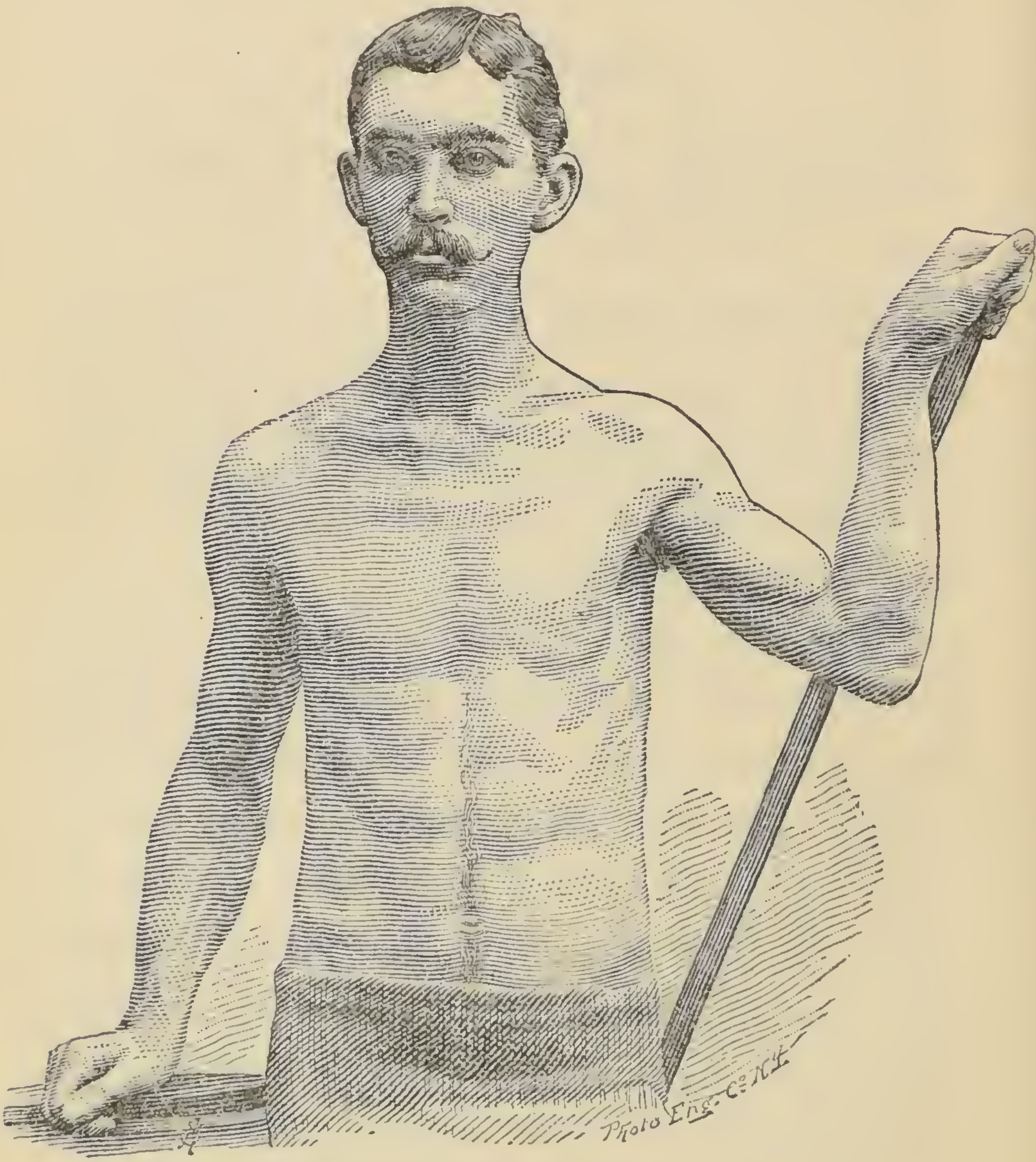


PLATE NO. I.—THE AUTHOR, 1878.

tific manner, I experienced the following results: In just three years I had developed every superficial muscle in my entire body,

which increased my weight to one hundred and sixty-two pounds—a gain of twenty-five

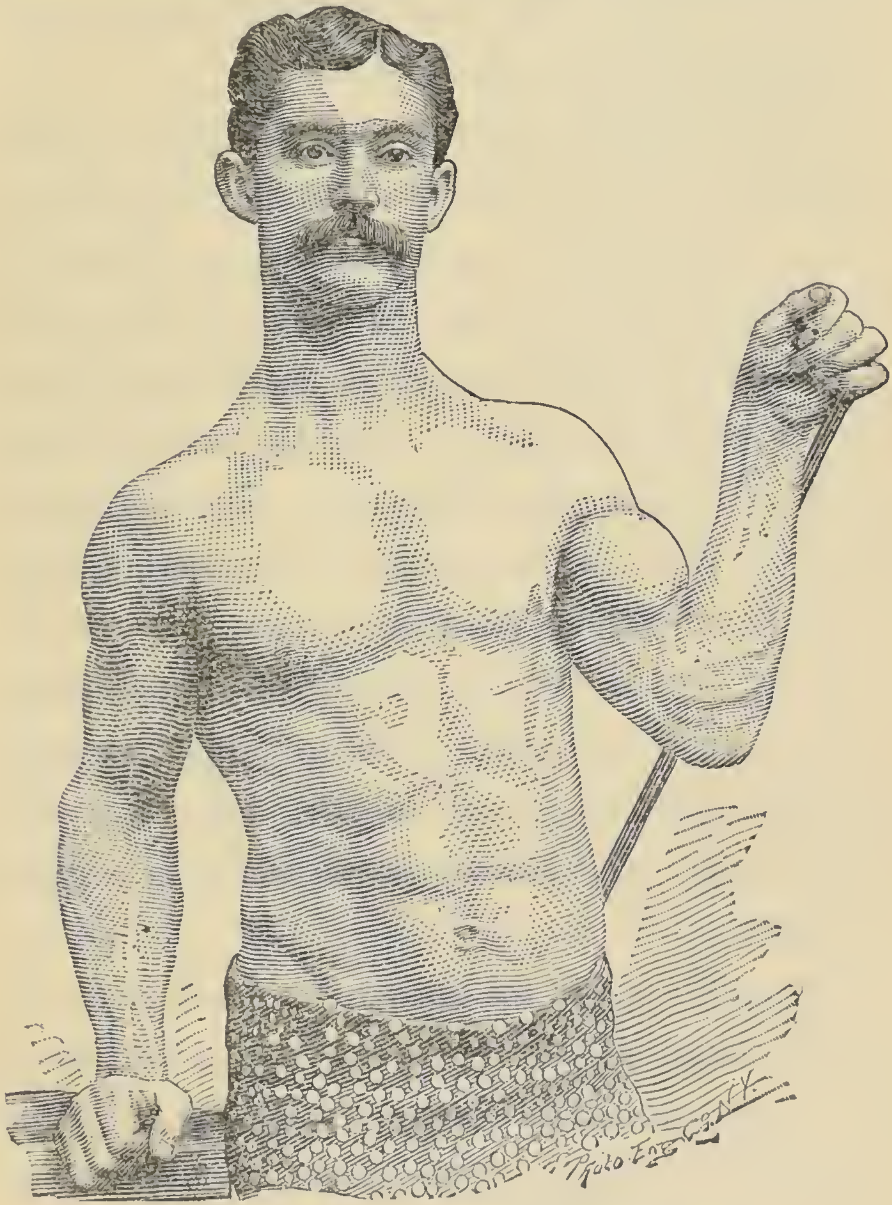


PLATE NO. II.—THE AUTHOR, 1882.

pounds of muscular tissue—and increased my height from five feet eight inches to five feet

nine, and my health has been made perfect. I am completely well every hour the whole year through. My muscular power has been trebled in nearly every respect.

When I had practised about a year promiscuously, and made up my mind to continue in a more systematic way, I thought it would be a good plan to have a photograph taken showing the condition of my muscular system, that I might be able to contrast it with others which I might get taken at a later date, and thus be able to note the difference, if any, between them after a stated time.

Plate No. I. is from a photograph showing my physical condition before I began to practise scientific physical culture, and that, too, after a year of indiscriminate work in a gymnasium.

Plate No. II. is an engraving from a photograph taken about four years later, assuming the same position as in Plate No. I., and being the same focus from the camera, showing the condition of the muscular system at that time and at the present. The contrast between the two cannot fail to show the dif-

ference. You will notice in Plate No. II. that every muscle is larger and stronger. The chest in Plate No. I. is not only flat, but sunken; while in Plate No. II. it is full and round. In fact, this is characteristic of the whole figure—one is flat and thin, the other is round and plump.

These conditions show much stronger in the photos than in these engravings. You will perceive that the face even has been broadened and strengthened, as represented in Plate No. II. It did not take the full difference of time (four years) represented in the dates of the plates. I was but three years in bringing about this change.

I continued, for two years after this period, with the same amount of exercise daily, without making any change whatever in my measurements. I suppose the reason was simply that I had reached my limit in so far as bulk was concerned. But I think my strength still increased a trifle, as I have no doubt it is still doing in some parts of the system, although all the exercise that I take now is in showing pupils how to make the

movements, which is enough to keep me in perfect condition. It does not require a great amount of exercise to sustain one in condition when once there.

I will here introduce a few extracts from the *New York Clipper*, the *New York Times*, and the *Worcester Gazette*. My excuse for extracting them is not from any desire whatever to set myself up as a champion; but perhaps it may be the means of inspiring others with more confidence in the method of physical culture contained in this volume.

(From the *New York Clipper*, 1883.)

Professor D. L. Dowd was born at Nelson Flats, a small town in the Empire State, twenty-nine years ago, stands 5 feet 8 inches in height without shoes, and weighs, stripped, 152 pounds. He is a man of remarkable muscular development, and immense physical strength. He has always been temperate, never having used either malt or spirituous liquors, and having eschewed coffee and tea during the past dozen years. Last fall he posed as a model at the Art Students' League and the Academy of Design, New York, and also at the Art Guild, Brooklyn. He was pronounced the finest developed model they had

ever seen. His greatest recorded hand-lift is 1,442¼ pounds of iron. He informs me that he has never lifted all he can, and has never failed to lift all he ever tried; that he can hold out, at arm's length, a 95 pound dumb-bell; crowd up slowly, with one arm straight above his head, a 175 pound dumb-bell; draw himself up fairly and squarely, with arm extended at full length, by one little finger, till his chin will pass above his hand, and do a great many very difficult muscle feats, some of which require quickness and suppleness of movement. This is the result of four years' practice of his method of light exercise.

Unlike many athletes noted for great muscular strength, Professor Dowd seldom puts his physical powers to a test with heavy work. Previous to making his last and best lift, he had not tried his powers in the same way for about eighteen months. He practises light work regularly with the classes in his own gymnasium.

(From the *New York Times*, 1884.)

Wallack's Theatre was crowded, as usual, at the performance last night, but Lulu failed in almost every experiment she attempted. Professor D. L. Dowd, the athlete who defeated all her attempts last Friday night, foiled even the umbrella trick last evening.

Mr. Dowd has been for the past several years a teacher of physical culture in Spring-

field and Worcester, Mass., and has made a thorough study of the phenomena of physical force. In conversation with a *Times* reporter, yesterday, regarding Miss Hurst's feats, he said: "The performance of the girl depends for its success far more on the rapidity of her movements, and the strategy which she uses, than on the actual force she exerts, and it is for this reason that her power appears to the spectators *magnetic*, instead of muscular. The truth is, it is muscular force applied strategetically. When I went to see her, I believed, from what I had read and heard, that the girl really possessed some wonderful and mysterious power; but I had not been on the stage with her ten minutes before I discovered that she used little muscle but a good deal of strategy, and, being thoroughly acquainted with the effect of the two elements combined, I was fully prepared to defeat Miss Hurst's object when it came my turn to be operated on. I took the cane in my hand, and she placed the palm of her hand against it, with her arm nearly at full length.

"You know that when the arm is in this position it is capable of exerting more force in the pushing movement than when it is bent. The first pressure of the girl came from the triceps muscle of the arms, which straightened them at full length. This is a very slight movement, and hardly perceptible to spectators, but it is a strong one, and was intended to push me backward, as so many

before me had been. I anticipated it, however, and braced forward, so that she failed to move me. Then came the strategy of which she makes such good use in all her performances. The moment she felt me brace toward her, she reversed her pushing movement, and bringing her biceps muscle into play, tried to pull me toward her in the direction in which I was bracing, her object being to take advantage of my power, to use it against myself, and exerting very little of her own force. As I knew what was coming, however, I reversed my movement, at the same time bracing backward, and she tried for five minutes to move me without success. She was equally unsuccessful in all her tests with me, simply because I was as quick as she was in reversing the direction of the force I was exerting, and I was strong enough to resist her pushing and pulling. The only secret of her performance is, that she is quick enough to use your own power against yourself, unless you understand the workings of the different muscles brought into play. Lulu Hurst is a very strong girl, but I think I could select a thousand such girls in this city."

(From the *Worcester Gazette.*)

The undersigned, having tried D. L. Dowd's system of physical culture, at No. 33 Pearl Street, recommend it to any and all ladies and gentlemen as a beneficial and

healthful exercise. Mr. Dowd is a thoroughly competent and careful teacher, and we take pleasure in recommending him and his system to the public.

ROCKWOOD HOAR,
OTIS GOODMAN, M.D.,
DR. J. F. ADAMS,
DR. G. F. HARWOOD,
DR. A. F. TOWNSEND,
DR. CHARLES L. NICHOLS,
FREDERIC KIMBALL
CHARLES F. ALDRICH,
W. A. PICKETT,
S. E. GREENE.

CHAPTER V.

PHYSICAL CULTURE FOR THE VOICE.

Before entering fully into the details of special exercises for the development of each part of the body, I will write a few pages on physical culture for the voice, to be followed by exercises for facial and neck development, and hints for the complexion, and special exercises for improving certain deformities.

Physical Culture for the Voice.

The human voice, the most charming of all musical instruments in its production of tone, is, many writers tell us, the most difficult of all to control or understand. Why should it be so? I think one great reason is that almost all teachers being absolutely ignorant of the physiology of the throat, they advance the absurd theory that such knowledge is unnec-

essary. Now I would inquire how any one can develop a certain muscle, or set of muscles, if they are ignorant of their position or action?

Developing voice (that is, quality) is simply developing muscular tissue, since it is impossible to make a movement, or sound of any kind, without muscular contraction. Now it is self-evident that to develop any particular muscle, or set of muscles, we must first have an exact knowledge of where they are, and what they are there for. You may say they are there to make tones, of course, and that is all the knowledge you need. True, they are there for that purpose. But suppose in the effort, instead of a beautiful tone, it comes out a screechy, or throaty, or nasal, or guttural tone? Plainly something is wrong, and you need to know something more than that. You need to know just why the tone has not been produced as nature intended, making a melodious instead of a disagreeable sound. Now, assuming that the organs are not diseased, when a disagreeable tone is produced it is caused by some muscle or muscles con-

flicting with others; if you know what muscles are conflicting with others, you must learn the action of each one, or set of them, so that you can take each separately and develop it, by giving it a plenty of the work nature has designed it should do; then, when each muscle, or set of muscles, has been drilled to do their part, they will mind their own business and let others alone. Then only will the voice, in so far as quality, volume, and power are concerned, be developed. With this knowledge there is no reason why a voice should not be developed in much less time than it requires to develop the average voice of those who are so fortunate as ever to reach that point.

I venture to say that scarcely one in ten of those who spend four or five years in vocal culture ever reach even a fairly good standard of excellence as vocalists; and I think the great majority of them have little more voice than when they started out.

This may seem almost incredible; but I think those who have watched the progress of vocal pupils as critically as I have will

agree with me. I have been a victim myself of teachers who had no practical knowledge of the means by which the voice can be made to produce beautiful sounds with power and volume.

To commence with, I was possessed of a pure tenor voice, with a range of two octaves, reaching as high as E, above the tenor high C, but my tones were very light and thin. In 1881 I went to a teacher in Brooklyn to have my voice tried. It was at once pronounced a phenomenal voice in range and sympathetic quality, and "there was a fortune in it." But the fortune did not come until after I had adopted a new and scientific method. I am fully convinced that I am now pursuing the right and only course to develop all there is in a voice, without the slightest danger of evil results.

I studied with this teacher four months, and I must say that the voice was somewhat improved by the method—called the Streeter Method—although I am quite convinced, by what I have since learned from a thorough study of the subject, that neither my voice, nor

any other person's, ever would be made more than what might be called a very fair voice in quality, but without force or volume; for a voice may be very small, and yet have force of expression: one of those voices that make the listener dread lest it may break on each succeeding note, and that is just what would happen if the singer were to attempt to increase the power ever so little.

My next teacher pronounced my voice to be about what the first had: "there was surely a fortune in it."

I studied with this teacher a year—Madam Rudersdorff's Method this time. I improved in the upper register, but lost in the lower.

I was then turned over to another, who was acknowledged by my previous teacher a superior instructor.

I studied with this one a year and a half, without any change for the better, although he must have the credit of knowing that I was singing wrong, for he very often told me so, even up to the last term, and he endeavored to set me right.

But the trouble was he did not know just

where the fault lay, and therefore could suggest no practical means to correct it.

The teachers I had been studying with before would repeatedly say to me, "You are all right; keep on with your practice and you will come out all right in time." I have had half a dozen instructors in New York who told me the same thing.

Well! I kept on till I had put in three years of steady practice and study, and finally ended up with almost the loss of my *speaking* voice, to say nothing about my *singing* voice, which had entirely vanished.

Then I said to myself, "Something is radically wrong about this voice culture," and I set to work to make a study of it in a scientific manner, as I had with the science of physical culture, only a few years previous, and mastered it.

I can therefore to-day say, with the utmost confidence, that I know positively I am possessed of the knowledge, based on thoroughly scientific principles, and that practically I can and will develop any voice that is not diseased, in one-third the time it usually takes,

and be sure of every voice at that, and not merely a fraction of them ; for the same rule that will develop the muscles in one person's sound throat will do so in another's. That the same muscles were put in every one's throat to do the same kind of work, is just as true as of the muscles of each one's arms to do their work. This idea of applying one method to develop one person's voice, and another method for another person's, is an absurdity which is some day in the near future to be held up to ridicule.

In three months after adopting natural means for restoring and developing the voice, I could sing infinitely better than I had ever been able to sing before. The fact is, that before this I could not sing at all. I am happy to say that when I sing now my voice—I am assured—gives pleasure to those who listen, and the pleasure it affords me is worth all the pains and time I have taken and the money spent on its cultivation.

These principles which I am elucidating are so *simple*, they have been overlooked and unnoticed. The record of all scientific re-

searches has been the same; when they were at last discovered.

Most searchers after vocal truths try at the outset to shroud everything in mystery, and search on accordingly, and consequently learn nothing of real practical value. It is not enough to simply know that such muscles are adductors, or abductors, or contractors, or relaxors; but to know just how to make them do the right thing at the right time; that is the all-important part to know, and control. Real, practical knowledge in this matter of developing the voice is what vocal teachers need, and what they nearly all lack.

I will cite one instance out of the many which have come under my notice since I have made any pretensions to developing the voice, or, I may say, teaching how to use what is already developed; for, in the great majority of instances, the development is there, but the knowledge of how to use it is wanting. A young lady came to me in June, 1885, to take a few lessons in physical culture, not knowing at the time that I gave instruction for developing the vocal muscles. It was

not long, however, before she became aware of the fact, and was very much interested in the ideas set forth. She had, the year previous, been studying in Paris with that excellent teacher Madame Marchesi, who, I believe, enjoys the reputation of being the most successful instructor of the female voice in Paris. I gave this lady a lesson in abdominal breathing first, after she had given me an example of what she could do. I had to try several different devices before she could get control of these muscles, not by any use of the voice, however, as is generally the case. I then gave her a few lessons in controlling the muscles of the throat, and she progressed rapidly. When each new difficulty was mastered she would say: "Why, that is exactly what Madame Marchesi tried a whole year to have me do; but I could not seem to get control, or understand how to do it." And yet this lady had been drilled for a whole year by one of the most eminent teachers, and without success, simply because the teacher had no really practical method for bringing about those natural results which

the pupil gained with me in half a dozen lessons.

But I must give Madame Marchesi due credit, in this instance, of knowing just where and what the faults were, and striving so diligently to correct them before going further in the instructions; proving that she must have had a correct knowledge of the right and the wrong conditions of the throat and abdomen in their relation to producing tone quality. Madame Marchesi had doubtless recognized the fact that the lady's throat and breathing powers must first act independently of each other at the will of the performer, before any change of voice in the right direction could be expected, instead of taking it for granted, as most vocal teachers do, that the continual practice of tones would eventually set things right. Thus, by trying various experiments for making tones to produce the quality which they fancy is the right one, if they do not finally ruin the voice they do it incalculable injury.

It is not at all necessary that a teacher, or the vocal student, should know the anatomy

of the throat in its entirety, yet this is very desirable, but only the muscles that are subject to the will. These are the ones that we have so much trouble with in developing the voice, and not the others not subject to the will of the performer—called the involuntary muscles. Nature has so constructed the involuntary muscles that they act in accordance with it (without being subject to the will), as much so as the heart or lungs do. Their function is not to act at all times. But when we will the voluntary muscles to contract, in order to produce tone, then the involuntary muscles spring to their posts at once, and each time alike, unless in case of disease.

Those of the voluntary muscles that give us most trouble are the superficial ones, the very ones which the will may control the most easily, when we have once gained the mastery of them. The diaphragm is not a superficial muscle, but we can very easily get perfect control of it when the right means are adopted; and that, too, without producing tone, thus running the risk of straining the voice at the same time.

Of the abdominal muscles, some of them are superficial and some are not, as some only of the throat muscles are superficial. If the throat is just the right shape, to commence with (full and round), then you may think yourself lucky, for very few are so gifted. Look at Fig. No. 1, which is the perfect shape for a good voice. If you have a throat shaped like Fig. No. 2, you must practise the exercise there given until, when you attempt to sing, the throat will assume this shape easily — like that of a canary-bird's throat. It must not be held stiff, but left to vibrate. Unless your throat assumes this shape you cannot make a tone of volume, for the column of air will pass up through the vocal tube, and strike far back in the throat against the soft palate and produce a throaty, or a smothered sound (see direction of the arrow in Fig. No. 2).

This side position of the face and neck represents it cleft in twain, to show the throat in a natural manner. But if your throat is shaped as is seen in Fig. No. 1, the column of air will follow the direction of the arrow, striking the

hard palate in the front of the mouth, giving a beautiful, ringing quality that will travel to the farthest corners of a large hall, with very little effort on the part of the performer; and besides, too, the volume will be increased four-

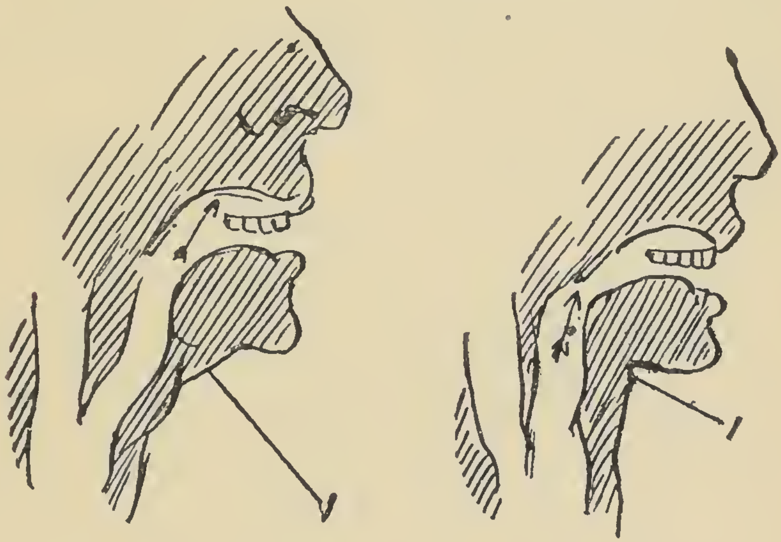


FIG. 1. FIG. 2.

The Correct and Incorrect Positions of the Throat for Singing.

fold, from the fact that the opening in the throat will be so much larger—not the opening of the vocal cords (or glottis), but that part of the throat called the pharynx. The column of air that passes between the vocal cords is not changed, only it finds more room in the pharynx to vibrate—a larger surface,

and consequently larger vibrations, or larger volume.

The throat is more open when it is in position like Fig. No. 1, because the larynx has been drawn further down the throat, and the tongue, being attached to it, has been drawn down also, thus flattening it at the base, as is represented in Fig. No. 1.

When the throat is in the right position, if you have the knowledge how to use the power, you can do so without any fear of having the voice crack, for the cavity is large enough to allow the column of air, however strong, to be all converted into vibrations of sound. It is always advisable not to use *all* the power you have, but reserve some of it. If your throat, however, is shaped like Fig. No. 2, the tone will be a small one, and will bear but a very slight degree of pressure.

EXERCISE NO. 1.— FOR THE CONTROL OF THE VOCAL MUSCLES.

In order to shape your throat like Fig. No. 1, you must faithfully perform the following

exercise, which is quite difficult for some, and very easy for others, to get the knack of; but you will surely accomplish it if you persevere. I have never yet known one to fail in it.

Put your forefinger and thumb against your larynx (Adam's apple) till you feel it move downward, and then force the larynx down the throat as far as possible; not with finger and thumb, but muscles connected with larynx and tongue. If you cannot control the larynx at will, then you will have to resort to this way of moving it down, until you get control, namely: run the tongue out as far as you can, then draw it back quickly, forcibly, and downward as far as you can. Practise this until you get perfect control of it, and then you can keep the tongue in and do just as well. Be sure and keep the fingers there until you are absolutely certain that you have the right movement. (It is a good idea to stand before the mirror, so that you can see the throat swell out.) If you feel the larynx pass downward, the movement is right; otherwise it is not.

This is an exercise that you can practise at

almost any time, and you should do it several times a day to gain the quickest and best results. After the first week or so, make the movement as strongly as you can, but be careful to commence lightly. The next exercise belongs also to vocal culture.

CHAPTER VI.

EXERCISE NO. 2—FOR THE PRACTICE OF DEEP BREATHING.

Deep breathing, or abdominal breathing, has been written about, and talked of, a great deal in its relation to voice culture; more especially about inhalation, but very little about *how* the breath should be exhaled, which is the all-important part, in a vocal sense. I think it matters little, comparatively, how the breath is taken in, so long as the lungs are filled; but it matters very much how it is let out. I know of trainers who teach the pupil, when making a tone, to depress the upper part of the chest, and press the front and sides of the abdomen outward.

Now, how ridiculous this way of forcing the breath out of the lungs seems, if we stop to reason a moment! To produce tone we simply force a column of air out of the lungs,

and when we commence, at the top of the lungs, to compress them in order to expel the air, we simply expel only a little of the air which is contained in the very apex of them, and the rest is forced downward (where it is of no use), as is proved by the protruding of the abdomen.

Now, for instance, if you hold in your hands an air-bag filled with air, and the escape at the top is rather small, and you want to get the air out a little faster, would you squeeze the bag at the top, or at the bottom? You would at once say, at the bottom, of course. Then why not do the same with the lungs, by the contraction of the diaphragm and abdominal muscles, which are vastly the stronger muscles? And surely, if they are set to work to push the air out of the lungs, then, of necessity, the walls of the front and sides of the abdomen must be pressed inward and upward, instead of, as in the other case, forced outward and downward; not only proving it to be a very inefficient means of producing tone, quality, or strength, but in many cases a very injurious practice.

It causes undue straining of the upper chest-walls, which produces an irritation of the mucous membrane lining of the bronchial tubes, and consequently an over-secretion of mucus, which makes the voice husky and harsh—worse than no voice at all for singing.

It is most discouraging to a pupil in voice-culture, to have, what one teacher pronounces as abdominal breathing, another laugh at as ridiculous, and advance something as directly opposite as possible, and call it by the same name. I cannot conceive how it is possible to be deceived in a thing so simple as abdominal breathing, especially by those who pretend to teach it to others.

I do not see any chance for discouragement on this point, unless it be between persons who guess at facts without taking a means to prove them. What I understand, practise and teach, abdominal breathing, means simply this: When the breath is inhaled, the abdomen is protruded outward from the pit of the stomach downward (see Fig. No. 3), and when the breath is exhaled, the abdomen at this point is compressed in-

ward and upward (see Fig. No. 3). As my experience and study have proved, this is purely abdominal and natural breathing. This manner of breathing is for some, at first, quite difficult, but more especially for ladies, to get control of, because of tight-lacing and wearing corsets, which prevent the free action of this part of the body. (Ladies, for shame, to be killing yourselves by this senseless and most ugly practice!) But you can do so in a short time, if you will make up your minds to.


Fig. No. 3.—Abdominal Breathing. (See 1 and 2.)

When performing this movement of the abdomen, you must be careful not to let the walls of the chest move outward only when you are exhaling the breath. It is perfectly natural that the walls of the chest should move outward when the breath is being *exhaled*, for the volume of air contained in the lower part of the lungs (if the expiration be a quick one, as it should be in practice) is forced

upward much faster than it is allowed to escape between the vocal cords, and consequently, being driven upward by the action of the diaphragm and abdominal muscles, must necessarily press outward and upward the walls of the chest. If the expiration be long continued, then at last the walls of the chest must recede in expiring the last breath that is possible from the lungs ; and this should be done in practising breathing, but not while making tones.

Now for the movement. Stand with the body erect, the feet together, the hips drawn back, the chest projected forward, the shoulders drawn back, the head erect, and the chin drawn in (see Fig. No. 14) ; place the right hand over the abdomen in front, just below the pit of the stomach, and place the left hand on the front of the chest, at about the centre of the sternum (breast bone).

To commence with, do not try to take in a very large volume of breath, for you can get control much sooner with a slight effort. First blow out all the breath you can from the lungs (pressing the abdomen at the same

time with the right hand so that it will recede); then take in a little breath, and be sure that, when inhaling, your right hand will be pushed outward by the protruding of the abdomen, without the slightest movement of the chest where the left hand is stationed. Now be sure that you do not get deceived by the movement, and protrude the abdomen when you are exhaling, instead of when you are inhaling. You must not allow the chest to make the slightest movement when you are filling the lungs, only when you are emptying them; the chest-walls will swell out as the breath is expelled. This will happen, of course, after you make a strong effort in the exercise. (It is a good plan to practise this before a mirror, so that you may keep the head and body erect, and at the same time watch the movement to see that it is rightly performed.) You should continue this exercise until you have tired the muscles, or you feel that you have had enough to do some good.

You will find that this exercise is also a splendid one for a dyspeptic or weak stomach,

for regulating the digestion, and the functions of the liver. For those suffering from lung troubles, or if not, the best general breathing exercise will be by taking full and slow inspirations, that is, commence by filling the lower part of the lungs first, as in abdominal breathing, and gradually suck in the air until you have filled the lungs the entire length. At the last of the inspiration, raise the shoulders to take the weight from off the chest, then exhale quickly and forcibly, driving out all the air possible, so that you can take in a larger volume of fresh air. You can take in a larger volume of air in this way of inhaling than in any other.

For those who use the voice a great deal, it is better to take the breath through the mouth, if there is not any dust in the air; for fresh air has a tendency to toughen and put in a healthy condition the mucous membranes of the air-passages. And still another reason why vocalists and speakers should take the breath through the mouth instead of the nostrils, is because they are obliged to when performing, and the direct practice of breathing

in this way, without producing voice, will be found to be a great aid.

Some object to this way of taking the breath through the mouth, for they assert that it dries the throat; and very true it does, if it is not understood and practised in a scientific manner. If the throat is open fully, as in Fig. No. 1, there will be no dryness felt, and you can take in a very large volume of air in an instant, and that, too, without that extremely disagreeable gasping noise some vocalists, and some speakers and actors make when taking in breath. But if the throat be closed, as is represented in Fig. No, 2, then the column of air is drawn against the back part of the throat, which makes it dry and irritable, and will produce that disagreeable noise we have mentioned above. If abdominal breathing prove to be difficult to control, you will find it advantageous to lay out at full length on the back, and try and breathe in a natural manner; that is, do not make any special effort, but draw in the breath as you need it. In almost every case this will induce abdominal breathing. After you have accustomed

the muscles to become obedient to the will, you can breathe abdominally standing as well as in any other position.

I must here say another word concerning the open position of the throat, for it is the *first* and all-important point to vocalists; *then* comes abdominal breathing, or, more correctly speaking, abdominal exhalation.

An excellent practice for shapening the throat is to put the throat in the position that is represented in Fig. No. 1, and hold it there as long as you can. You can practise this at almost any time or place, while walking or working.

Now, do not slight this because it seems so simple, for I know positively that, just so sure as you practise this faithfully, it will be the means of increasing the volume and quality of your voice beyond recognition, if it be a small voice, and of poor quality to commence with. I am not speaking of students just entering on vocal studies especially, for there are many who have spent money and years of study to whom this will apply.

CHAPTER VII.

FACIAL AND NECK DEVELOPMENT, AND HINTS FOR THE COMPLEXION.

It is a fact that the muscles of the face are as susceptible of development as any muscles of the body. The method is a very simple one, but it needs thorough application. No one can doubt for a moment that a full, round neck, and plump cheeks, add greatly to one's beauty of face. The only way to get this full neck and plump cheeks is to go to work intelligently to develop the neck and facial muscles, which alone causes the lines of beauty to appear. You may, perhaps, think it unnecessary to develop muscular tissue in order to gain beauty, and you can gain it only by getting a little more fat. *This is a very great mistake.* The lines of beauty will be found only where the muscles are plump and firm.

The most perfect facial beauty can exist

only where there is the most perfect development of the muscular tissue. We see hundreds of faces round and plump, and yet cannot call them beautiful, or even pretty. They are all fat and no muscle. Again, we have seen faces that you would call perfectly beautiful, and many very handsome, that were not at all fat; but there was just enough plumpness from the development of the muscular tissue to bring out nature's beautiful curves. The development of the muscles of the face and neck fills up the hollows, and causes the flesh to have a firm and healthy look; whereas the addition of fat without muscular development will cause the flesh to look weak and flabby.

The following exercises are intended to develop the principal muscles of the face and neck, such as the laughing muscles of the cheeks, muscles of the chin, and of the neck. If you look in the mirror and smile as broadly as you can, you will readily perceive which the laughing muscles are, from the way they bunch up, one on each cheek, directly under the eyes, F, G, and H (see Fig. No. 4); also the bunches which form at each corner of the

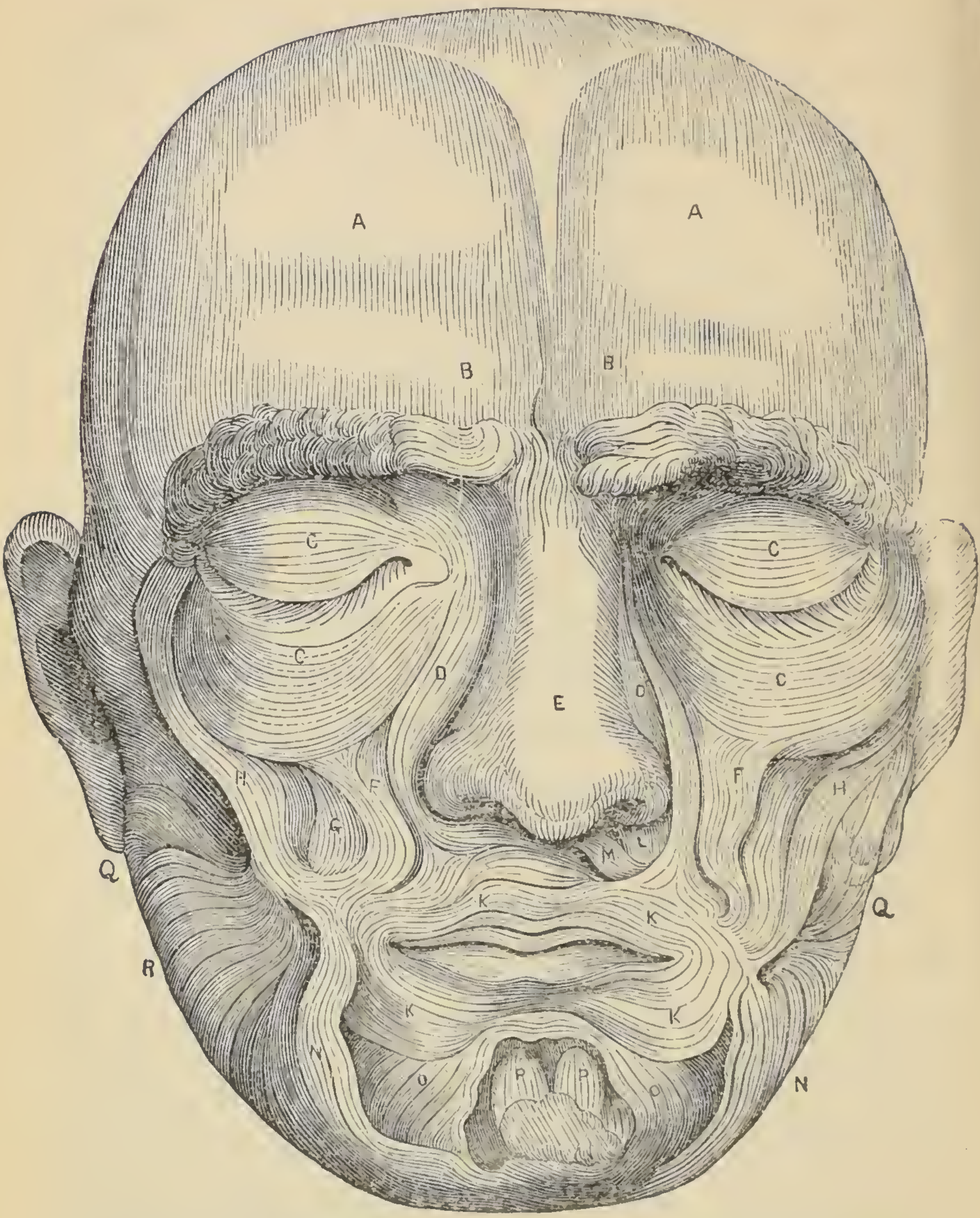


FIG. NO. 4.—MUSCLES OF THE FACE. A, Occipito Frontalis; B, Corrugator Supercilii; C, Orbicularis Palpebrarum; D, Levator Labii Superioris; E, Compressor Nasi; F, Levator Labii Superioris; G, Levator Anguli Oris; H, Zygomaticus; K, Orbicularis Oris; L, Depressor Alæ Nasi; M, Nasalis Labii Superioris; N, Triangularis Menti; O, Quadratus Menti; P, Levatores Menti; R. Buccinator.

Of the muscles shown on this plate the ones most necessary to develop in order to fill out the cheeks and chin, are the ones marked F, G, H, N, O, P, R, for which exercises are here given.

mouth in the centre of the cheeks (see R, Fig. No. 4). The chin muscle is the one which forms the point of the chin (see O, P, Fig. No. 4), and its office is to press the lower lip upward.

The muscles of the neck are the sterno mastoid, the upper portion of the great trapezius, and the platysma myoides (see Figs. 10, 11, 12, and A, in Fig. No. 9).

The sterno-mastoid one on each side of the neck, are the ones which move the head from side to side; they also work in conjunction with each other, and move the head forward, the upper portion of the trapezius muscle being attached to the lower edge of the skull behind; when in contraction it moves the head backward. The platysma myoides muscle is a broad, flat, thin one, and covers almost the entire front of the neck; it lies just beneath the cuticle (skin), and is attached along the chin and nearly the whole length of the lower jaw, and also, at its lower insertion, is attached to the cuticle of the chest below the clavicle (collar bone), and when in contraction it pulls the corners of the

lip downward. This muscle can be thickened, and so add greatly to the beauty of the neck and throat.

EXERCISE NO. 3.—LAUGHING MUSCLES.

The levators labii superioris and anguli oris, and zygomaticus. (See F, G, H, Fig. No. 4, and 1 in Fig. No. 5.)

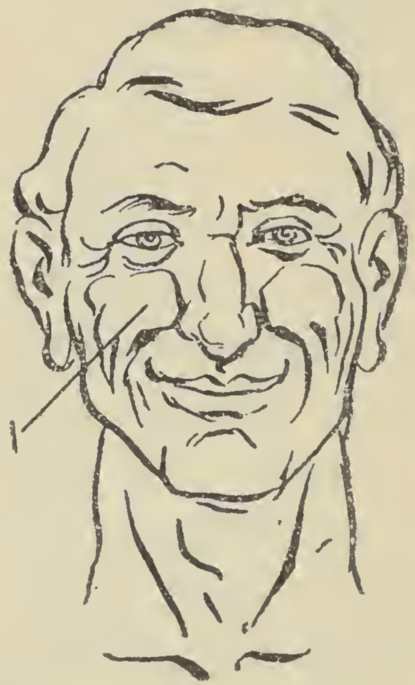


FIG. NO. 5.—See 1—Levators and Zygomaticus.

First, contract the laughing muscles as hard as possible by smiling as broadly as you can; now, if you will look at Fig. No. 5, you will see how these muscles bunch up, one under

each eye; then, placing the ends of the three first fingers of each hand high up on each muscle, now press down slightly the fingers on the muscles while you are contracting them, that is while you are attempting to make the effort to smile. The exact thing which you must do is to put the muscles into contraction by smiling broadly, and then instantly allowing the features to relax and assume their natural expression again, and continue to do so, until you have tired the muscles of the face named; but you must be sure that each time you smile you relax the muscles instantly and keep up the pressure with the fingers against the muscles; and remember that the fingers must be placed and held high up on the muscles, and the pressure must be downward, but not so strong but the contraction of the muscles will push them upward each time. It is advisable, while performing this movement of the facial muscles, to stand before a mirror until you have gained perfect control of them. (You can readily understand that the pressure of the fingers, while the muscles are in contraction, makes

the desired resistance which is necessary to the rapid development of the muscular tissue; and which is also equivalent to the resistance which a dumb-bell, or other weight, would give in developing any muscle of the body. The levator labii superioris is the proper elevator of the upper lip, carrying it at the same time a little outward. The levator anguli oris raises the angle of the mouth, and draws it inward; while the zygomaticus raises the upper lip and draws it outward.)

EXERCISE NO. 4.—RISORIUS AND BUCCINATOR MUSCLES OF THE CHEEK, STRAIGHT OUT FROM THE SIDES OF THE MOUTH (FIG. NO. 4, AND 1 IN FIG. 6).

Once more allow the features to be drawn into a smile; but this time, instead of allowing the corners of the mouth to be curved upward as seen in Fig. No. 5, try and have them drawn straight out toward the centre of the cheeks as seen in Fig. No. 6. Now, with the balls of the thumbs placed on the cheeks (at the point where the indicating line running from the little figure 1 stops) and pressing

toward the corners of the mouth, contract and relax the muscles alternately (by drawing the corners of the mouth straight out to the centre of the cheeks, toward the ball of the thumb). Be sure and not make the press-

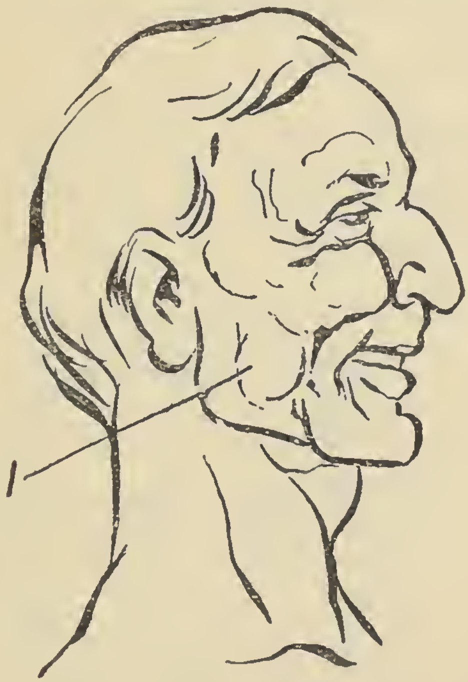


FIG. No. 6.—Buccinator and Risorius (Sec 1).

ure of the thumb so strong against the muscles, that when they are in contraction they will not be able to force the thumbs back each time as they should do. Repeat this movement until you have tired the muscles named. (The buccinator and risorius muscles, when in contraction, draw the cheeks at

the corners of the mouth inward and backward, as is represented in Fig. No. 6.)

EXERCISE NO. 5.—LEVATORES MENTI, AND TRIANGULARIS MENTI MUSCLES OF THE POINT OF THE CHIN. (SEE FIG. NO. 4, AND I IN FIG. 7.)

Stand before your mirror, to be sure you are doing the right thing, press the lower lip

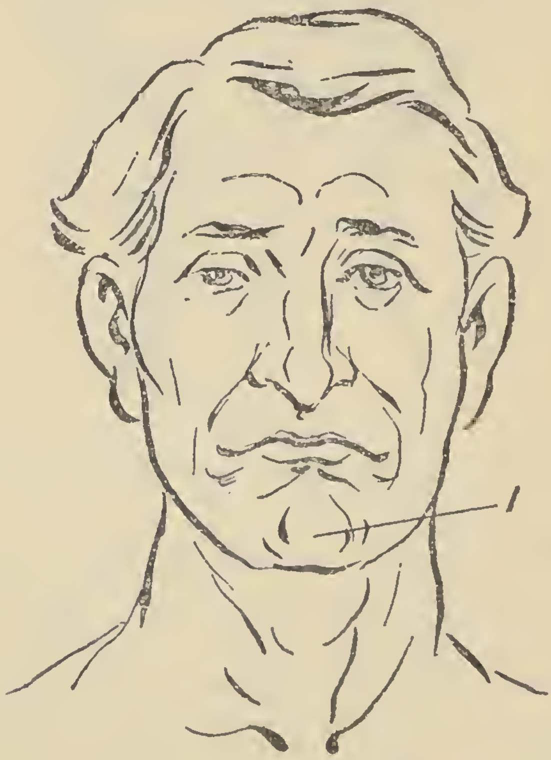


FIG. No. 7.—Levatores and Triangularis Menti.

upward by depressing the chin, as in the act of pouting (see Fig. No. 7), as strongly as

you can; crook the forefinger so as to make a half-circle of it; put the half-circle form over the point of the chin just below the mouth, and press downward lightly with the finger, while at the same time you are pressing the lip upward strongly enough to push the finger up with it. You must remember, that after contracting the muscle hard enough to force the finger upward, to relax it instantly and allow it to assume its natural condition again, and repeat the movement until you have tired the muscles of the chin. (In this exercise be sure and keep the teeth closed, to abort any false movement of the lower jaw. The levator menti and the triangularis menti, when in contraction, push the lower lip upward and draw the corners of the mouth down.)

EXERCISE NO. 6.—THE TEMPORAL MASSETER AND INTERNAL PTERYGOID MUSCLES FILLING IN THE SPACE BETWEEN THE UPPER AND LOWER JAWS AT THE BACK PART. (SEE 1 IN FIG. NO. 8.)

Most faces that are at all thin are apt to be very hollow at this point between the upper

and lower jaw, and this exercise for developing these muscles will prove to be a very good one, if rightly understood and practised thoroughly. They are the muscles that press the lower jaw, or the lower against the upper

FIG. NO. 8.—Masseter and Pterygoid.

teeth, and to develop them we must give them plenty of just this kind of work.

Take two small pieces of india-rubber, about a quarter of an inch square, and insert one on each side of the mouth between the back teeth; close the teeth on them the same

as if you were chewing gum ; spread the teeth only just far enough apart each time to admit of the rubbers being kept in place. Repeat this movement of the lower jaw till you tire the muscles.

The temporal masseter and internal pterygoid, when in contraction, raise the lower against the upper jaw with great force, and are brought into perfect development by this exercise, thereby filling up the hollows spoken of.

Another exercise that will aid very materially in plumping out the cheeks is to put the fore finger in the mouth between the cheek and the teeth, and press the cheek outward in every conceivable way you can, and all parts of it, and especially back as far as you can.

EXERCISE NO. 7.—PLATYSMA MYOIDES MUSCLES COVERING THE FRONT OF THE NECK. (SEE "A" IN FIG. 9.)

Again standing before the mirror, attempt to draw out and down the corners of the mouth. (It may take you some time to get control of this muscle; only persevere; when you do get control, you will see the cuticle (skin) on the entire front of the neck move upward. This muscle is attached to the cuticle of the chin, and around nearly the whole length of the lower jaw; its lower insertions are attached to the cuticle of the chest, and when in contraction it pulls the corners of the mouth downward and the cuticle of the chest upward. To get a good idea of this muscle see *A* in Fig. No. 9.)

EXERCISE NO. 8.—STERNO-MASTOID MUSCLES ON THE SIDE AND FRONT OF THE NECK. (SEE I IN FIG. 10.)

Put the palm of the right hand on the right side of the head, near the top (see Fig. No.

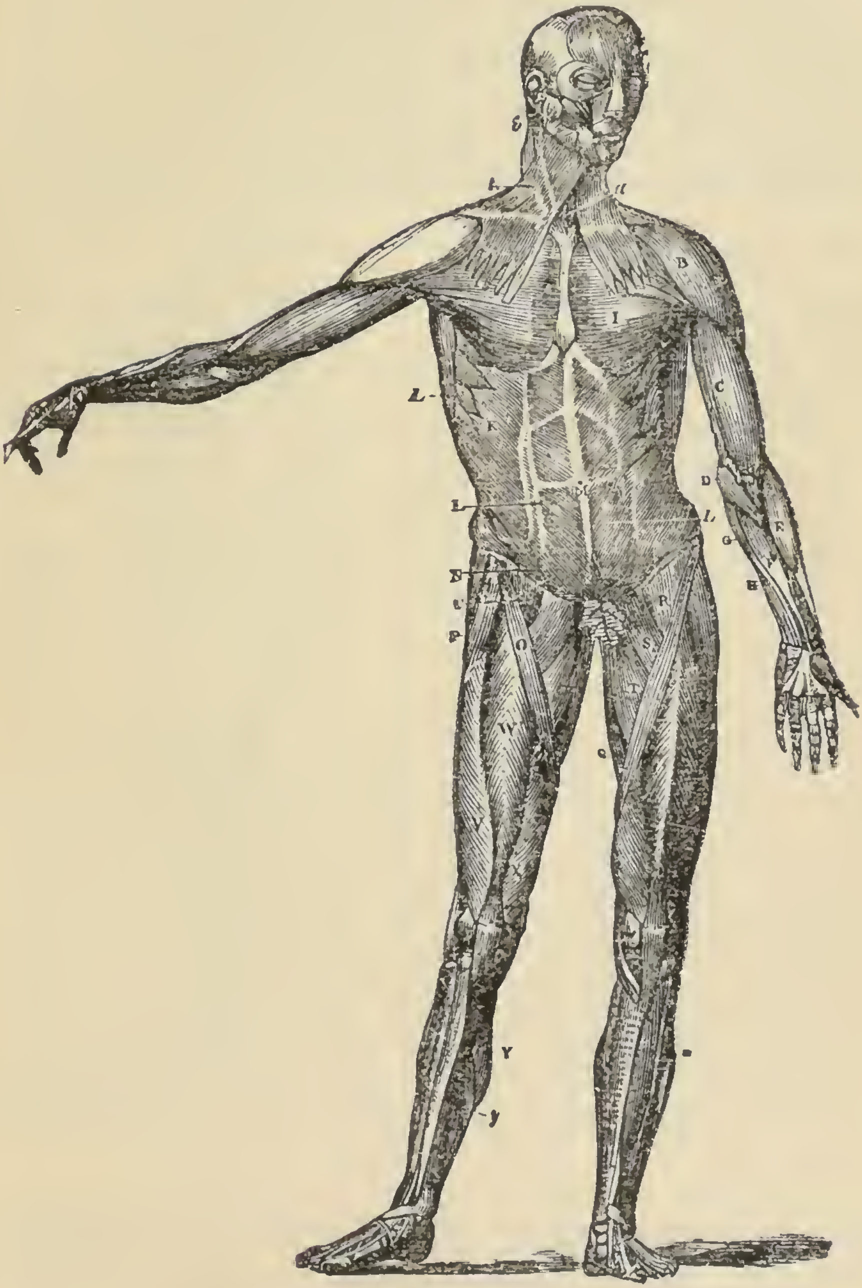


FIG. No. 9.—Platysma Myoides. (See *A*.)

10), and press the head hard against the hand, at the same time making a little resistance with the hand (that is, push a little) against the head, but allowing the sterno-

FIG. NO. 10.—Sterno-Mastoid.

FIG. NO. 11.—Sterno-Mastoids (See 1.)

mastoid muscles to overcome the resistance by forcing the head sideways over the right shoulder. Repeat this movement until you tire the muscles on the right side of neck, and then change to the left hand and to the left

side of the neck, and do the same. (The tendons of the sterno-mastoid muscles at their lower insertions are attached to the points of the clavicle (collar-bone) above where the clavicle is attached to the sternum (breast-bone), and at their upper insertions are attached to the cranium just back of the ears; and when in contraction they move the head from side to side, and both contract at the same time, and move the head forward and downward; they also twist the head to the right and left.)

If you have an exerciser (see Plate III.) you can develop these muscles of the neck more rapidly with it than in this manner, and the exercise will prove much more agreeable; but if you have not an exerciser, you will certainly do well to follow these instructions faithfully.

EXERCISE NO. 9.—BOTH STERNO-MASTOID MUSCLES TOGETHER. (SEE I IN FIG. II.)

Place the palms of the hands against the forehead, near the top; press the head forward

strongly ; at the same time press up lightly with the hands, but not so hard but that the contraction of the muscles will overcome the resistance of the hands, and the head come forward and downward so that the chin will touch the clavicle (collar-bone). (See Fig. No. 11.) Repeat this movement till you tire the above-named muscles.

EXERCISE NO. 10.—UPPER PORTION OF THE TRAPEZIUS MUSCLE ON THE BACK OF THE NECK. (SEE 1 IN FIG. 12.)

Interlace the fingers and put the palms of the hands against the back of the head, high up; and then drop the head forward, press it backward, and at the same time pull forward with the hands, but not so hard but that the muscles on the back of the neck will be able to straighten the head up and carry it backward as far as it can go (see Fig. No. 12). (The upper portion of the trapezius muscles, at their upper insertions, are attached to the lower edge of the cranium (skull), and at their lower insertions are attached to the

upper part of the scapula (shoulder-blade), and when in contraction they move the head backward and downward.

All of these muscles should be exercised

FIG. No. 12.—Upper Trapezius. (See 1.)

until they are tired. The oftener you do it the sooner you may expect good results—do it three or four times a day, if possible. In all of these movements be sure and allow the muscular contraction to overcome the resist-

ance, or the muscles will not get the full contraction necessary for rapid development. In order to gain perfectly satisfactory results from this system for development, it is only necessary to attend strictly to the text and be faithful to yourself. I can only prescribe; you must apply the remedy.

CHAPTER VIII.

A FEW HINTS FOR THE COMPLEXION.

A clear skin is to be desired above all else in the matter of facial beauty, even more than regular features. A person may have regular features, but if the cuticle has a sallow or pimply look the beauty is not there. If one is blessed with good, regular features and a clear, healthy-looking complexion, then, indeed, is the face beautiful. The beauty of *expression* is not wholly within the power of the individual, but is what the mind (soul) will make. The beauty of complexion is within the reach of nearly everyone, and the means by which it may be obtained are very simple, being the most natural. (Let me here add that temperance in all things is the first rule to be observed.)

Most ladies have a very erroneous idea about taking care of the complexion. After

washing the face, instead of rubbing it hard with the towel until it is perfectly dry and smooth, they simply pat it with the towel. Now this patting the face dry is one of the surest ways of spoiling a good complexion, for this reason: The cuticle is a very active agent (when in a healthy condition) in removing through the pores a great amount of waste tissues and poisonous gases from the body, which is constantly exuding an oily fluid, which is the natural oil for lubricating the cuticle, and is mixed on the surface with the perspiration, and dries there. If it is not removed it causes irritation and leads to various skin diseases.

Now, unless you use good soap and water, with plenty of hard rubbing, this mixture is not easily removed, and, consequently, the face and hands, being exposed, are liable to chap and pimple, and what are commonly called *black-heads* come in most cases from the same cause. Black-heads are generally supposed to be a kind of skin worm, but this is a false idea. The truth is simply this: The skin, either from lack of cleanliness or activity, or both, has

failed to remove the waste materials from the pores, and the black-head is formed from dirt adhering to the oily substance of the gland.

I was recently explaining to a friend what black-heads were (he having some on his face), and he immediately exclaimed, "My face is not dirty!" "No," I said; "of course not; but do you use soap when you wash your face?" No, he did not. "And do you rub your face hard and dry, after washing?" No, he did not; he thought rubbing would make the face red, and it was red enough now. Now that is exactly why his face was red, and sore with pimples. It had not been rubbed, for that process stimulates the circulation of the blood in these parts, which causes a healthy action of the skin and removes the waste matter from the glands; we must use good soap to dissolve it and remove it from the surface. Most of us know how difficult it is to clean the hands without the use of soap; especially if they happen to be a little greasy, it is almost impossible to cleanse them without the application of soap. The same is true of the cuticle of the face and body.

Some ladies argue that the application of soap will leave the face shiny. To be sure it will, if it is allowed to remain on; but never, if the face is rubbed perfectly dry with the towel.

What I have been trying to convey in all this argument is, that just so sure as you use plenty of good soap and water, and then rub your face hard till it is perfectly dry and smooth, once a day (but the oftener the sooner will good results show), just so sure will you make great improvement in your complexion; only rub a little carefully until you have toughened the skin, and you will soon be surprised to find what an amount of rubbing it will bear. *Hard rubbing will make the skin as fine as silk, and to the touch it will feel like satin.*

The skin in this condition is a thousand times more beautiful than when powdered, and will bear close examination. The closer you get to such a complexion the more you will admire it, the closer you get to a poor or a made-up complexion the less you will admire it.

CHAPTER IX.

THE GRACEFUL AND THE UNGRACEFUL FIGURE. (SEE FIGS. 13 AND 14.)

Really graceful figures are objects that we very rarely see at present. As a race the American people, in each succeeding generation, seem to be losing in physical grace, both in figure and in movement, even though our schools for teaching these accomplishments are tenfold more numerous than in the days when the great majority seemed to be possessed of bodies that had beauty and grace in every outline, and each movement was the perfect poetry of motion. Only now and then do we observe this to-day. But let us be hopeful that a great change will take place at a no very distant period.

Let us analyze a little. In the first place, what is grace, and what is the use of possessing it? Let me answer the last question first.

If we have an educated sense of the beautiful, and almost all teachings have a leaning in this direction at the present time, then we are pleased to look upon grace and beauty. It imparts to the beholder a delightful emotion of pleasure, and to the possessor the consciousness of being a silent instructor in the artistic, and such lessons oftentimes carry conviction, and are more productive of good results than oral teaching.

I think you will agree with me that anything that will delight the senses is most beneficial to our physical being, and that when we are bettered physically we are also bettered mentally and morally; hence I claim this as one of the many good reasons why we should possess grace and beauty.

If we happen to be less sensible to its charms, others may not be, and we thus may help some who in some way may need it more.

What does grace imply or signify? In short, what meaning do we try to convey when we speak of physical grace? Do we mean that it is beauty of face or figure, of the muscular system, or of the bony structure

which delights us? Possibly we mean to convey the idea that it is all of these combined that produces the grace we notice in the light tread of the panther and the majestic pose of the lion's head, or, in fact, almost all animal creation not subject to the rule of mankind?

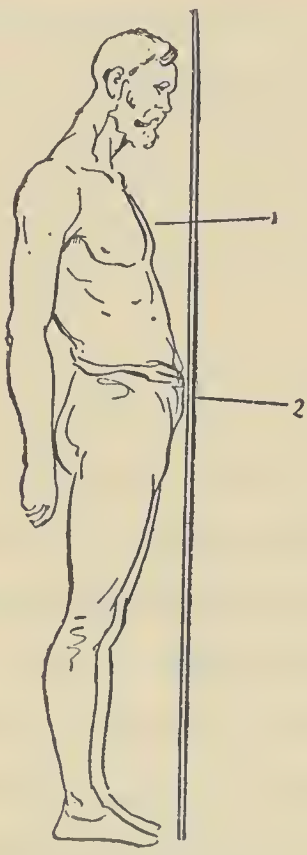
In the brute it is undoubtedly true that all these beauties united produce graceful motion; nature has so decreed it. But in mankind this rule does not hold good. (The why is not easily explained.)

We may be fully developed, without appearing to reach perfect grace. If each muscle were dissected it might prove to be the perfection of development, and each separate bone also bear the same inspection; and yet such perfection of structure, by being carried out in an apparently awkward and slovenly manner, might appear anything but graceful.

Why is this? One reason is that certain of these muscles, by being neglected, have lost their vitality and refuse to perform their designed functions, and the body is allowed to be pulled to one side or the other, causing, in time, curvature of the spine; or the head be

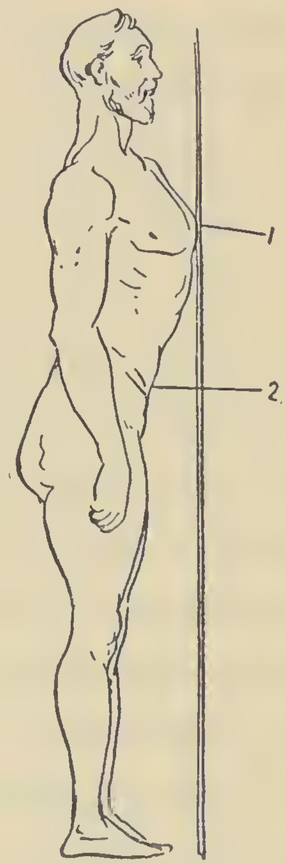
allowed to pitch forward because the muscles in front of the neck are stronger than those on the back, producing an over-balancing of

Fig. No. 13.



Incorrect Position.

Fig. No. 14.



Correct Position.

power, and the erector muscles of the back being used less than some of the muscles of the front of the body the hips are drawn forward, giving a very awkward curve to the spine (see Fig. No. 13). All these defects

can be corrected by the practice of scientific physical culture.

Fig. 13 shows the position in which ninety-nine out of every one hundred persons stand.

Another reason why one may be fully developed, and yet not be graceful, is that one may think he is posing or walking gracefully when he is not, and thus appear more awkward than graceful, from a lack of knowledge necessary to show off the beautiful figure which nature or physical culture has given him.

As has been stated it is possible, for reasons we have explained, to be fully developed and not be graceful. But it is not possible to be the perfection of grace without *complete* physical development — every muscle must be brought out to perfection, and every bone must be well proportioned. It *is* possible, with an undeveloped figure, to make very graceful movements. But if the person performing the movements be not naturally the perfection of grace in his or her completeness, then it is not possible to show the perfection of grace in the motions, for to accomplish that

the person must captivate the senses first. Contrast Fig. No. 14 with Fig. No. 13, and you will see what a very awkward and ungainly pose a graceful figure can assume when left to take care of itself.

These two engravings, Figs. Nos. 13 and 14, are faithful drawings of the same man, one showing the same development as the other, the sole difference being in the pose when taught how to stand. They are drawings from the author of this work, and are absolutely true to life. One is the model of grace, the other just the opposite.

EXERCISE NO. 11.—HOW TO ASSUME THE GRACEFUL POSITION.

To be able to assume this graceful carriage of the body (see Fig. 14) in a natural manner, you must first develop and strengthen the muscles on the back of the neck; namely, the upper part of the trapezius, and the rectus abdominalis and erector spinæ, and make every effort to assume this position at all times you can. Put both feet together (or, if

you are moving about, you need not pay attention to the feet), draw the hips well back, project the chest forward, draw the shoulders back, hold the head erect with the eyes looking on a straight line ahead of you, and draw the chin in.

If you will fasten a couple of small blocks on the side of your room somewhere, you will get along much faster and be more sure not to make a mistake in the pose.

You are to stand facing the wall with the toes within two inches of the base-board (if there is no base-board then stand with the toes just three inches from the wall), touch the wall with the chest just at the pit of the stomach (see Fig. No. 14), have a block (or some substitute for it) five inches thick put between you and the wall at about the points of the hip bone in front where you see the line from No. 2 in Fig. No. 14, and another block between the chin and the wall four inches thick. If you will do this you cannot go wrong, and you will be surprised at the good results in a short time.

EXERCISE NO. 12.—FOR IMPROVING BOWED LEGS.

I think, in the great majority of cases of bow-legs that have come under my notice, the bow

FIG. No. 15.—Bowed Legs.

has been at the knee, and in such cases the deformity can be very greatly improved by the following exercise. (In cases where the bow is caused by a bend of the bones of

the leg below the knee-joint there is but little hope of straightening them, except in children, in whom the bony structure has not yet reached maturity; for such there is hope, if this exercise is faithfully practised three or four times a day, or the oftener the better after the muscles have once become used to the work.)

Stand with the feet spread apart (sideways), about two feet, the body erect, the hips drawn back, chest projected, head erect, and the chin drawn in, hands resting on the thighs as in Fig. No. 15. Now, without allowing the feet to move from the position which they occupy, make an effort to move the knees toward each other, causing them to make a kind of spring movement inward (see Fig. No. 15). You can add a little help by pressing with the hands against the thighs at the same time that you make the effort to draw the knees toward each other, if you do not seem to have power enough in the muscles of the legs to give satisfaction in making the effort.

After a week or ten days, perform this movement until you tire the muscles quite thoroughly. The muscles which are brought into

contraction in the exercise are the adductors (see Fig. No. 52).

EXERCISE NO. 13.—FOR IMPROVING THE DEFORMITY KNOWN AS KNOCK-KNEE.

This deformity of the legs which we term knock-kneed, from the fact that the knees are

FIG. NO. 16.—Knock-Knee.

so shaped that they are liable in fast walking, or running fast, to come in contact with each other. I find, in the great majority of cases

—like bowed legs—they are confined mainly to the joint, although in some instances the deformity is in the bone of the leg below the joint; however, the former is the most prevalent, and it being just the opposite from bowed legs, I prescribe an opposite remedy.

Stand with the body erect, the feet together, the hips drawn back, the chest projected, shoulders drawn back, the head erect, and the chin drawn in. Now, without moving the feet from the position in which they have been placed, make an effort to separate the knees by a side movement, causing them to spring apart as seen in Fig. No. 16 in the dotted lines. In this exercise the feet should not be allowed to move apart; if they are inclined to separate when you are standing on a smooth surface, you will find it better to stand on a rough surface. After a week or ten days' practice, you will find it to your advantage to practice this exercise three or four times a day, and each time until the muscles are tired.

The muscles which are brought into contraction are the abductors (see Fig. No. 53).

EXERCISE NO. 14.—FOR CORRECTING THE DEFORMITY KNOWN AS WRY NECK.

This deformity, which is considered extremely ugly (see Fig. No. 17), is, I think, more prevalent than any other of the human figure. The causes which bring it about are numerous, but the ones most conspicuous, perhaps, are, *first*, the low desks which children have to study over while at school have more influence in bringing about this condition of the spine of the neck than any other cause.

The head is continually bent forward for hours, and it is not any wonder that after a time the head will assume the position in which it is most often carried or held; and besides, we all have a strong tendency to look downward rather than upward the greater part of the time. When we are eating our meals we look to the plate, when we walk out we look down naturally, to escape the glare of the sky, more especially if we have weak eyes; then in the office at the desk the head is drooped forward nearly all the time. So with

all of these causes brought to bear, it is not strange that the muscles on the back of the neck (from the non-use of them) grow weak, and allow the head to droop forward.

FIG. No. 17.—Wry Neck.

Most persons with this deformity, can, by an effort, make the head and neck assume the proper position, and hold it so for a short time; but there are a great many persons who have allowed this deformity to grow upon

them to such an extent that it is not possible for them, with the greatest effort, to make the head assume the right position. The reason is easily explained: the curvature is in the spine, and usually extends from about the tenth or eleventh vertebra upward (or the spine between the shoulders). There being between each vertebra of the back-bone a thin layer of cartilage, as we have before remarked, of a gristly nature, which serves as a cushion for the vertebræ to move upon, thereby saving the spine from injury in case of a sudden shock. If the vertebræ are continually tipping forward, this cartilage, being of a very pliable nature, is squeezed together from the pressure of the front edges of the tipping vertebræ, and thus thinned on their inner edges. At the same time the outer or back edges are being separated, thus allowing the cartilages between them to thicken and harden, thereby causing a permanent curvature to exist, until a remedy in the shape of an exercise is found for straightening it again. This exercise here given is very simple, but nevertheless a sure one if understood and practised faithfully.

Stand with body erect, feet together, hips drawn back, chest projected, shoulders drawn back, head erect, and chin drawn in; project the chin (moving the head forward also) as far as possible (without moving the body), and then draw the chin back and in, as hard as you can (see Fig. No. 17); keep the head up so that you will look on a line straight ahead of you all the while you are performing the movement. Repeat this exercise as often as three or four times per day—the oftener the better. Many people who have this deformity call themselves round-shouldered when, in fact, they are not so; when we come to examine, we find the shoulders are generally back in place, and the trouble is confined to the spine of the neck.

EXERCISE NO. 15.—FOR CORRECTING THE DEFORMITY KNOWN AS ROUND SHOULDERS.

The causes which bring about this deformity are quite numerous, and quite varied. The principal cause is (as in wry neck) from the fact that we are always more apt to bend and

reach forward, rather than backward. Each time the arm is extended the shoulder is also projected forward, and the muscles get many times more work to do on the front of the

FIG. No. 18.—Round Shoulders.

body than those on the back, and they get strengthened accordingly.

The muscles of the back of the shoulders are seldom used, unless you take special exercise for them, or the business in which you are engaged brings them into contraction,

which is very doubtful, and so must naturally grow weaker to a much greater degree than those in front. Hence, in consequence of the shoulders warping forward the chest is invariably flattened, thus in many cases causing pulmonary diseases, and many others, by cramping the vital organs so that they are unable to perform their functions in a natural manner.

The shoulders not only flatten the chest by being allowed to warp forward, but the flattening of the chest from any other cause will also, in the great majority of cases, cause the shoulders to warp forward.

Rowing is one of the worst exercises for warping the shoulders; it develops the muscles of the upper back so fully, and at the same time each movement forward flattens the chest and pulls the shoulder-blades upward and forward, causing after a time a displacement of them. This can be avoided if you will do something to develop the chest in proportion to the back. If you have not got some kind of an instrument like the exerciser so that you can practise exercises as given for the

Exercises Nos. 1, 3, 5, 7, 9, 13, then this exercise is the next best thing I know of to correct this deformity.

Stand with the body erect, the feet together, hips drawn back, chest projected, shoulders drawn back, head erect, with the chin drawn back. Then put the hands behind you and interlace the fingers ; next warp the shoulders forward a little, and then brace them back as strongly as possible (see Fig. No. 18) so that the shoulder-blades will come together. Practise this carefully at first, until you have accustomed the parts to the movement, then the oftener you practise the sooner you may expect good results. (The muscles which are brought into contraction to draw the shoulders back and shoulder-blades together are the rhomboideus and trapezius (see Fig. No. 34).

Wearing shoulder-braces does more harm than good ; I have never known a single case of round shoulders being improved by wearing them, from the fact that when artificial aid is resorted to the muscles that were put there to keep the shoulders back in place have

been supplanted by the brace and, consequently, the muscles grow weaker the longer the brace is used, and when at last it is taken off the shoulders will be found to be in a worse condition than at the beginning.

EXERCISE NO. 16.—FOR THE IMPROVEMENT OF THE DEFORMITY KNOWN AS LATERAL CURVATURE OF THE SPINE.

In spinal curvature the lateral or side curve is the most often met with, excepting wry neck, and next to that is, perhaps, the most unsightly, for in many instances it causes one shoulder to droop, the shoulder-blade to project, and one hip to recede, so that one will appear larger than the other.

Lateral curvature of the spine is brought about, like most other curvatures, from a number of causes. In children, as a rule, it makes its appearance first, and grows with the child until it reaches maturity, after which it is difficult to cure, although it is possible in some instances. But while the child is growing is the best time to correct this deformity.

Some of the most prevalent causes for the lateral curve are: First, a young child that is rather inclined to be heavy, and at the same time inheriting a weak muscular system, is liable to bring it about from the fact that the upper part of the body is too heavy for the delicate little spine to bear—hence the curvature; second, it is brought about sometimes in strong, healthy children, and also grown people, by continually lying on one side when asleep; and when sitting some persons seem always to choose a position so they can drop over to one side; third, continually carrying in one hand whatever weight is to be carried, which is another pretty sure means of curving the spine and drooping the shoulder.

This first exercise is given for raising the drooping shoulder to a level with the other and replacing the shoulder-blade if it be projected, which is generally the case. This exercise will have to be performed with the exerciser, or some similar contrivance.

Stand with the right side toward the exerciser if the left shoulder is the drooping

one; take the two handles in the left hand, set one foot a little forward of the other so that you can brace well against the movement, then with the body erect and the head

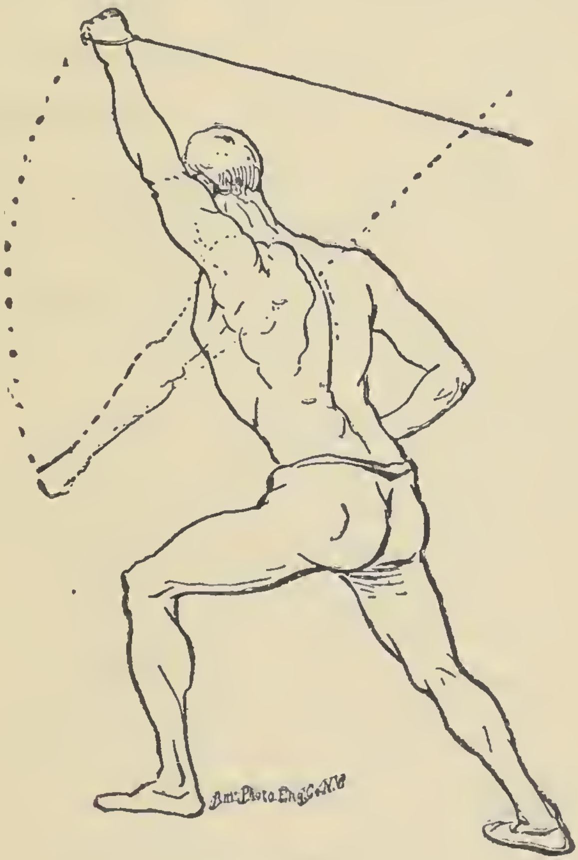


FIG. NO. 19.—Spinal Curvature.

well up, let the left arm be carried straight out and up from the side of the body, against the side of the head, but do not let the body sway sideways toward the exerciser as the arm is moving upward; let the arm go as high up

as possible (see Fig. No. 19). Repeat this movement until you tire the part being exercised.

Four more specially good exercises for the lateral curve are Exercises Nos. 11, 15, 17, and 22 (as given for the exerciser); and two especially good ones for developing the smaller of the two hips are also Exercises Nos. 28 and 32. Perform these exercises in exactly the manner they are explained in the preceding pages.

Sudden jarrings of the spine from a fall, or a jerk of the body in some way, oftentimes causes a lateral curvature. Parents often do great injury when they get provoked with the little ones, and give them a shaking up, or set them down on a chair or the floor suddenly. Such a thing would not, most probably, ever occur, if the parent were not extremely ignorant of the delicate structure of the spine of the child and the great importance of keeping it in a perfectly healthy condition.

There are more nervous diseases caused from a cramping or curving of the spine in some way than most people are aware of;

for, let there be pressure ever so light on the spinal cord (which passes through the whole length of the spine), and there will be serious trouble in some part of the system as a consequence. Hence the necessity for supreme precaution.

THE UNGRACEFUL WALK.

Probably there is not more than one person in a hundred who carries the body in a graceful manner while walking. Many do not care about appearing graceful, especially those who have no very vivid sense of the beautiful in nature. They may dispute this assertion and claim to admire nature's handiwork, when in truth their admiration amounts only to a desire to be thought to possess good taste; of this they give ample proof.

When I stop to think that man is the most beautiful creation of nature, and therefore should receive the most thorough and careful attention before all else in improvement, and that if one has a really genuine admiration for the beautiful in nature, it does seem to me

that the possessor would not, or could not, be so careless of this superb work intrusted to his keeping. Many have false ideas of grace in walking, gained from association or habit, and still there are others who may be said to walk in a graceful manner, but who do not appear to, because the body is not graceful of itself. To be truly graceful in action you must first be graceful in form. Before commencing this exercise take the position of Fig. No. 14.

EXERCISE NO. 17.—HOW TO BECOME GRACEFUL IN WALKING. (SEE FIGS. 20 AND 21.)

Stand with feet together, the body erect, the hips drawn back, the chest projected, the shoulders drawn back, the head erect, and chin drawn in (see Fig. No. 14). Now set the right foot back about twelve inches, and a little to one side of the left foot, with the ball of the foot *only* pressing the floor lightly (see Fig. No. 20); then raise on the ball of the left foot, and at the same time swing the right leg forward (see Fig. No. 21), keeping the knee

nearly straight and pitching the body forward at the same time; then perform the same movement with the left leg. For grace, the body in walking or in repose should incline

FIG. No. 20.

FIG. No. 21.

Grace in Walking.

slightly forward. If the weight is pitched forward by bending the body slightly at the hips, it is much more easily propelled than when it is pitched backward.

The idea in practising this exercise is to accustom you to rise easily and gracefully on the ball of the foot at each step, so that the leg which is passing forward will not be made to bend so much at the knee, which appears very ugly, and especially so in a lady, for each time the knee is projected against the dress it causes it to bob out at every step. But it should pass forward in a more graceful line and set squarely on the floor, instead of tipping the shoes upward and the heel downward (which sounds like a horse walking across the floor), as is generally done when the knee is much bent.

In the practice of this exercise you must be careful when rising on the ball of the foot that you do not make a quick, jerky movement of it, and so give the appearance of bobbing up at each step. The movement should be a gradual, rolling one, from the heel to the ball of the foot, and in a way that the body will appear to glide along.

With a little practice daily of this exercise you will soon be able to walk gracefully and easily, and will find that the calf muscles will

increase in size, for they are the muscles that raise the weight of the body and poise it on the ball of the foot; therefore the more you walk in this way the better you will develop the calf.

CHAPTER X.

A FEW EXPLANATORY REMARKS IN RESPECT TO THE PRECEDING METHOD.

It is not claimed that this system of physical culture is the only good one in existence. There are other good systems, I hope, among all the different ones which are taught and practised. But I think I am stating a truth when I say that this is the only thoroughly scientific system that I know, or have ever heard of, for developing every muscle of the body, arms, legs, and neck to the fullest extent, including the facial muscles, deepening and broadening the chest and strengthening the lungs.

All this can be accomplished with one simple little piece of apparatus, correcting deformities such as wry neck, spinal curvature, bowed legs, pigeon-toes, and vocal defects and deformities. I regard this as the very best system for a busy people.

Most American men and women, especially residents of our cities, have little time for daily horseback-riding, cricketing, or rowing. Certainly they have not the time, if the opportunity, to take daily work in a good gymnasium. The gymnasium must, then, be brought into the home and the office, to reach those who need it most.

This can be done with the system here taught, and there are few people who cannot spare from thirty to sixty minutes a day to devote to that preservation of health which, if once lost, they would give all they have earned while losing it to regain it again. This system has advantages over other methods, by its convenience and the saving of time and money.

One drawback that physical culture at home is subject to is, that most of the work recommended in books on this subject soon becomes distasteful. With loss of interest comes neglect, and thus with most people, and notably with the weak and badly developed who especially need such exercise. The physical training is carried on at home in a desultory

manner that brings no appreciable results, even if the exercises be persisted in for a length of time (which is not usually the case); work carried on merely from a stern sense of duty does but a small amount of the good that springs from exercise which interests and stimulates.

It is the universal testimony of those who have tried the system set forth in this book, that the exercise has not lost its interest for them as time went on. The thing most needed, then, is to get a form of exercise that will have the fascination of boat-rowing and horseback-riding without the one-sided development that comes from these exercises.

The system here taught meets this deficiency.

It will be found nearly as interesting as out-door sports, and at the same time will give a speedy and harmonious development of the entire body.

The reason why the work on the pulley-weight (or the Home Exerciser as it is here called; see Plate III.) system is less fatiguing and more interesting than most methods of

light exercise, is that less will-power is demanded to carry on the work.

With the dumb-bell there is a weight to be

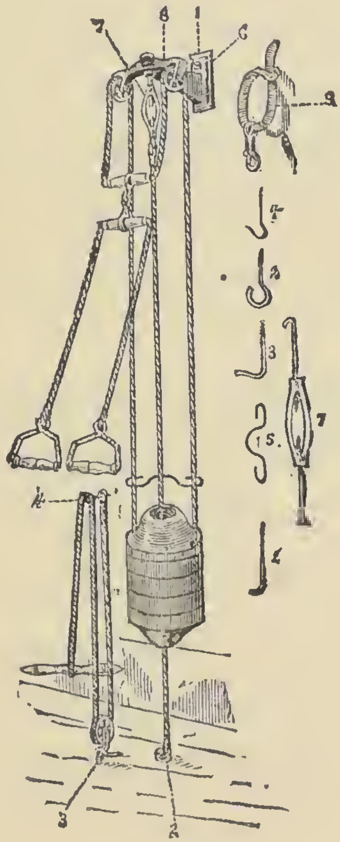


PLATE NO. III.—Home Exerciser.

held *all the time*, and a distinct effort of the will is necessary for each change in position; the motions too are more or less of a jerky character.

Those on the exerciser, on the contrary, are rhythmical, with a gliding, easy movement which does not require a constant effort of the will to continue, and that allows an interval of rest between each muscular effort. This advantage, which seems of minor importance when simply read in this connection, will be found of great importance. Practically it will make all the difference in the end between success and non-success in physical culture.

Another advantage this system of physical culture has over many, and, in fact, over most or all others, is that the work is calculated to develop the *trunk* of the body equally as well as the extremities. The end and aim of much gymnastic work seems to be to develop a large biceps-muscle, or enable one to do some particular feat of strength or skill.

As a result of such work, it is not very uncommon to find the athlete with the phenomenal arm, or the successful oarsman, dying of consumption! Many a fine fellow at Cambridge and Oxford trains for a boat-race, and wins heart disease.

The system of work here advised, however, tends to strengthen *all the vital* functions and processes.

It will be observed that in a great number of the exercises special directions are given as to the manner of breathing, so that with the movement the effect is to open out, broaden, and deepen the chest. It is not at all uncommon by such work to increase the chest-expansion two inches or more in a few weeks. The lower trunk, the front and sides of the abdomen, and the back are developed as rapidly as the chest. With this development of the chest and abdomen comes an improvement in the vital processes carried on in these cavities—respiration, digestion, excretion, and thus an increase in the vital force, so called. Hence consumptives, dyspeptics, obese people, and anyone with weak vital, as well as weak muscular power, can receive particular benefit from this system. Then another great advantage over most systems lies in the fact that *it is as well adapted to ladies and children as to gentlemen.*

HOME EXERCISES—PRINCIPLES.

There are certain principles on which this system rests which need to be explained, that the pupil may go intelligently to work.

First: Only light weights are ever used. The author recommends the strongest to use not over fifteen or twenty pounds on the exerciser, and those who are weak or badly developed should commence with five or ten-pound weights. In this manner danger of overstraining or injuring the system in any way will be avoided.

There are other reasons for using light weights. With a light weight the movements can be made rapidly and vigorously, and for a longer time without fatigue, than if a heavy weight be adopted.

It is a scientific fact that a muscle develops more quickly by making a large number of contractions, even though they be made with little effort, than by making a few contractions with much effort. For example: It takes the same amount of force to "curl" a

three-pound dumb-bell thirty times as to "curl" a thirty-pound dumb-bell three times; yet the movements with the three-pound bell will build up the biceps-muscle far more (and that, too, with less fatigue) than the few movements with the thirty-pound bell.

The reason is plain; every contraction of a muscle stimulates the circulation of blood through that muscle—forces out the old blood, loaded with worn-out materials, and makes room for new blood, with its supply of nutrition for building it up. Hence the greater the number of *quick* contractions the more rapid the circulation of blood through the muscles, and the more speedy their development.

The use of light weights has other advantages. One is that this system does not cause an enlargement or hypertrophy of the heart—such as is apt to come on in those who train with heavy, violent work, or that take part in contests of various kinds, such as boat-racing, running, etc.

The danger of a hypertrophied heart undergoing degeneration after middle life is

well known to experienced physicians, and even to the public.

There is a wide-spread belief among people, especially mothers, that physical culture by gymnastic exercises is accompanied with danger and is liable to cause disease later in life.

If there be good grounds for this opinion in certain systems of physical culture and in the indulgence in certain sports, there is certainly no such possibility of injury, either near or remote, in the system here advocated.

This system of light exercise also avoids the danger of the development of connective tissue between the muscular fibres; a development likely to take place from the use of heavy gymnastics.

Another important principle underlies this system: The exercises are so arranged as to bring as nearly as possible only one muscle, or one pair of muscles, into use at a time. The general direction is to make quick, vigorous contractions with one pair of muscles until they ache a little; and then to leave these muscles to recuperate, and bring an-

other pair of muscles, in a different part of the body, into use. Thus one pair after another is used, fatigued, and rested ; and when every muscle in the body has been physiologically exercised, the body, *as a whole*, instead of being fatigued is refreshed and put into a glow.

It needs no argument to show that this system, which exercises without fatigue and equalizes the circulation throughout the body, is the desideratum for sedentary people. Before proceeding to give this system of exercise in detail, it will be well to mention

A FEW BRIEF RULES.

First : There are no restrictions as to the time for exercise under this system, except that work should be avoided immediately after eating. The stomach needs the blood then to carry on the process of digestion and assimilation, and it should not be diverted either to muscle or brain.

The best time, perhaps, is midway between meals. But those who are actively engaged

in business, or have many cares, will find the morning and evening the most convenient time for taking exercise. The mind is then free, and the body loosely and lightly clothed—a very important matter.

It is not well to take the most severe or lengthened exercise before breakfast. If done, the exhaustion that succeeds will not be recovered during the forenoon.

On rising, twenty minutes' work on the chest exercises with the overhead pulley will not fatigue but quicken the circulation, and thus distend the lungs with pure air (the windows, of course, being open), and mind and body alike be refreshed for the day.

When one becomes robust and strong, an hour's *hard* work in the morning will do no harm. If one can spend thirty to sixty minutes in the afternoon, any time between three and six o'clock, it will be found that this is perhaps the best time of the day to work the muscular system. The fatigue and tendency to melancholy that usually come on at that period of the day will be quickly dispelled by proper exercise.

Fatigue is often due to the excessive use of a part of the body, and will be dispelled by exercising other parts, and thus equalizing the circulation. This is especially true of brain-workers. If one cannot spend time in the afternoon, take the hour between eight and nine, or nine and ten, in the evening. Refreshing sleep and an early waking will attend upon such habits.

For ladies, ten minutes on waking in the morning and twenty minutes each before dressing for dinner or supper, and before retiring, will be found convenient times for most, and will be amply sufficient.

People who are engaged at desk-work, book-keepers, authors, etc., should have the "exerciser" in their working-room, and once an hour take one or two minutes' work at the breathing exercise on the upper pulley.

Second: Study the muscles brought into play in each movement—the part of the body that aches after a number of movements is the part being exercised. The author recommends the pupil to learn the names of the

muscles mentioned in each exercise, and know their locations from the figures.

A study of the muscular system in this connection will not only add to his knowledge, but increase the pupil's interest in his work.

Remember, however, that the names of the muscles given with each exercise do not indicate *all* the muscles used in making the movement, but only the principal ones. If one be weak in any part, extra time should be spent for the first few weeks on the movements for bringing it up, until symmetrical development of the body has been attained.

Read the instructions for each movement *very carefully*, paying special attention to the manner of breathing, when this is mentioned.

In all movements that have a tendency to pull the body backward, set one foot well forward, with the knee bent, and incline the body far enough forward so that you will feel the weight resting on the *forward* foot, otherwise you will be apt to feel an uncomfortable strain across the small of the back.

To gain the best development of the mus-

cular system, repeat each movement until the muscles used in making it are *tired*.

Do not attempt to go through all the exercises at one time, unless you have plenty of leisure to work each part thoroughly, but as far as you go, work thoroughly, and at the next opportunity for exercise commence where you left off at the preceding time.

Persons who are too ill to stand up while taking the following exercises can do just as well sitting in a chair.

Those having pulmonary trouble should be careful in the breathing exercises until they have strengthened the lungs somewhat. Do not flatter yourself—as so many are apt to do—that you can afford to drop any of these exercises, and adopt some of your own invention to better advantage (unless you have made the matter a thorough study), for they are the result of several years' careful and practical study.

If the handles, pulleys, and swivels are kept well oiled they will not squeak or rattle.

In your exercises always use a weight that is agreeable to you, neither so light that there

does not seem to be resistance enough, nor yet so heavy that it will seem like hard work.

If you are using the "Home Exerciser," or any apparatus similar to it, if you make your

PLATE NO. IV.

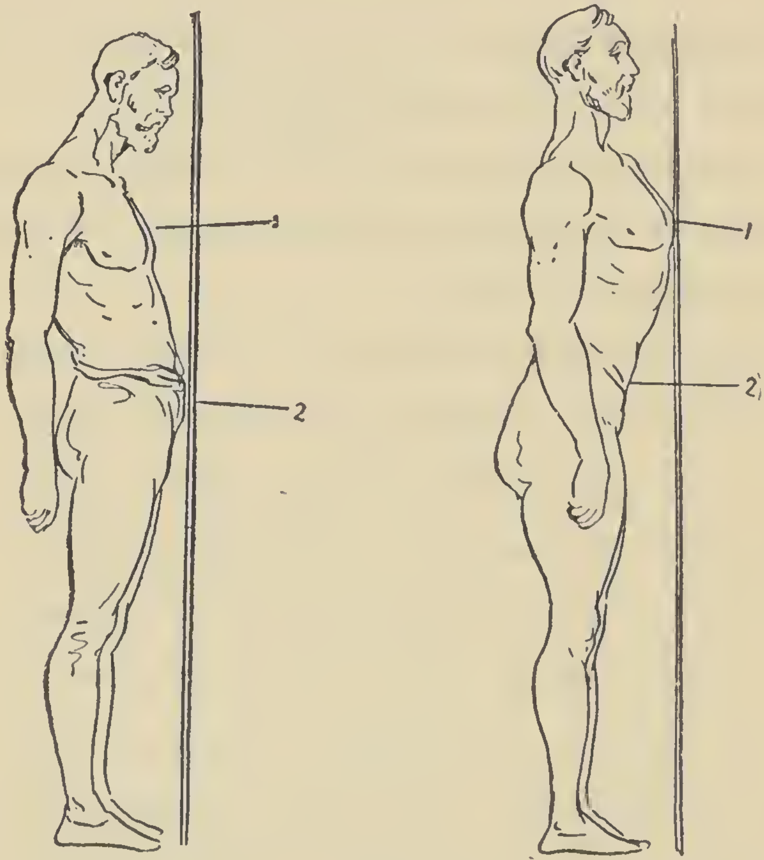


FIG. 1.—Awkwardness. FIG. 2.—Grace.

movements jerky the weight will twist about the central guide-wire, thus interfering with your exercising. The object of so constructing this apparatus is to remind you that you

are not doing your work in a manner that will be productive of the best results, for if you make jerky movements the muscles make only a quick, spasmodic contraction at the commencement of the movement, and are relaxed while making three-quarters of it; consequently it will take a much longer time to get satisfaction from the exercise than if you would make true, steady movements, and so keep up the contraction of the muscles throughout the entire exercise.

In the following exercise all reading that is not directly connected with the movements will be found in parenthesis.

In all exercises assume, as near as possible, the position represented in Fig. No. 2 of Plate No. 4, and avoid the pose of No. 1.

THE NORMAL MAN.

Professor Huxley asserts that the proper weight of man is 154 pounds, made up as follows: Muscles and their appurtenances, 68 pounds; skeleton, 24 pounds; skin, 10½ pounds; fat, 28 pounds; brain, 3 pounds;

thoracic viscera, $3\frac{1}{2}$ pounds; abdominal viscera, 11 pounds; blood which would drain from the body, 7 pounds. The heart of such a man should beat seventy-five times a minute, and he should breathe fifteen times a minute. In twenty-four hours he should vitiate 1,750 cubic feet of air, pure, to the extent of one per cent.

A man, therefore, of this weight, should have 800 cubic feet of well-ventilated space. He would throw off by the skin 18 ounces of water, 300 grains of solid matter, and 400 grains of carbonic acid every twenty-four hours, and his total loss during that period would be six pounds of water, and a little more than two pounds of other matter.

After learning all of the different movements explained in the preceding pages, for the development of the muscular system of the body, you can practise them without weights of any kind, and gain splendid results; but you must first become thoroughly acquainted with them, as they are to be performed with some apparatus like the one represented in Plate No. III.

CHAPTER XI.

(SPECIFIC) EXERCISES.

If you are not looking for any special results, but wish to attain what will do you the most good in a general physical sense, you should go through the following exercises in the precise order in which they are given in the following pages, as they have been arranged to the very best advantage in a practical, as well as in the most improvable, sense.

EXERCISE NO. I.—BROADENING THE CHEST.

Stand with the back to the "Exerciser;" take a handle in each hand, arms straight down at the sides, with palms to the front; step far enough forward that, when the arms are extended at full length above your head, the cross-piece to which the handle cords are attached will not strike the top of "Exerciser."

Set one foot forward, bend the knee, and keep the other leg straight; draw the hips back, let the chest project, shoulders be drawn

FIG. NO. 22.—Broadening the Chest.

back, head erect, chin drawn in. This describes the position.

Now for the movement. Bring the arms down with a lateral and forward movement to the lowest point you can, and see that the

hands extend forward from the hips, about twelve inches or more, and touch each other. If the handle cords come across the body at the waist just above the points of the hip-bones, you have brought the hands to the right place. Now let the arms go up with a lateral and backward movement to the highest point they will reach, bringing the hands together above; but on a line back of the head (see Fig. No. 22).

When the arms are passing both upward and downward, be sure to keep the elbows *perfectly stiff*, otherwise the chest will not get the full benefit of the exercise. (The reason why the chest will not get this benefit of the exercise if the elbows are allowed to bend, is that the pectoral muscles of the chest, being attached to the humerus (bone of the arm) near the shoulder-joints, and also to the sternum, and some of the ribs, and there are also some of the muscles of the back which are attached to the upper part of the humerus near the shoulder-joints and to the ribs below.)

Now, it will be plain to you that when the arms are moving upward, there is quite a ten

sion brought to bear on these muscles which are attached to the upper part of the humerus, and some of the lower ribs, providing the elbows are kept perfectly straight and rigid, for the arms then act as a leverage. The attachments of the lever to the ribs, being the muscles named, and so as the arms ascend, the ribs must necessarily be pulled upward and outward from the sides of the chest; but, when the arms are ascending, if the elbows are allowed to bend, the direction of the leverage is changed; the force of the movement goes to the bending of the elbow. On the contrary, if the elbows are kept perfectly straight, then the chest must get the benefit of the movement, and the tendency will be to pull the ribs upward and outward at the sides, thus broadening the chest.

Take in the breath strongly and deeply (if you are breathing pure air), through the mouth (as you can draw in a larger volume through the mouth than through the nostrils, and the more breath you can take in the better; for the quicker it will develop and strengthen the lungs), as the arms are ascend-

ing, and expel quickly and forcibly as the arms are descending.

Breathe in this way a number of times, and then take quite a full breath, and hold it while you make ten or twelve movements, or as many as you can conveniently. (The reason for holding the breath while the arms are passing upward and downward is to create a pressure internally; thus forcing the ribs and chest-walls outward, from the internal pressure.)

Go through this exercise till you feel that you have *tired* the chest quite thoroughly (after the first week's practice), as you must do with all exercises of the chest and muscles *throughout* the entire body, if you would arrive at the most speedy and beneficial results.

(SPECIFIC) EXERCISE NO. 2.—LATERAL AND POSTERIOR TRICEPS MUSCLES, BACK PART OF THE UPPER ARM. (SEE I IN FIG. NO. 23.)

Stand facing the "exerciser;" grasp the handles in either hand with the elbows crooked, and bring them close to the sides of

the body; stand far enough back so that when you are going through the movement the cross-piece to which the handle-cord is attached will not strike the "exerciser" at

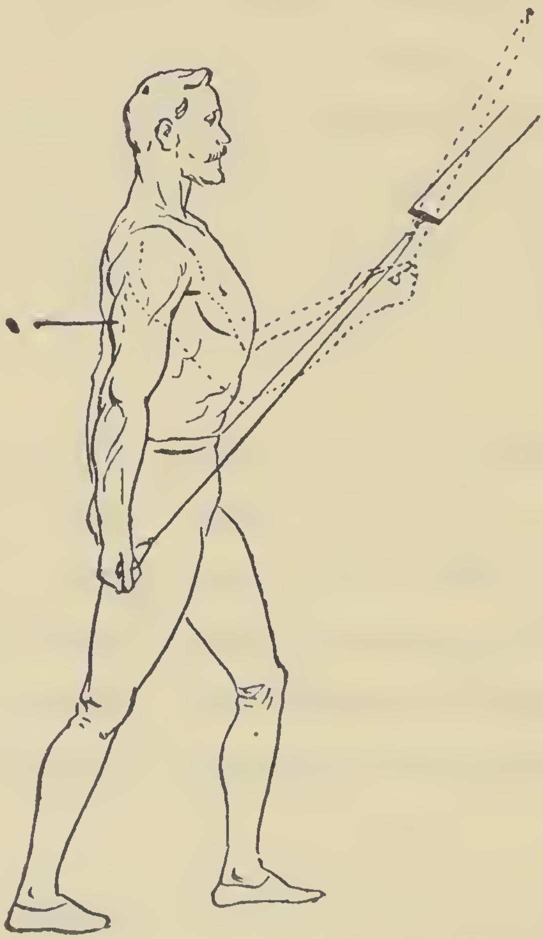


FIG. No. 23.—Triceps Muscles.

the top; body erect, feet together, hips drawn back, chest projected, shoulders drawn back, head erect and chin drawn in. And now, without allowing the arms to move from the sides

of the body, straighten the arms at the elbow by bringing the hands squarely down to the side of the hips. Let the hands go upward without changing the position of the upper arms at the sides, and then straighten again.

Repeat this upward and downward movement of the forearms, letting them go to the highest point above, and the lowest below, until you feel the muscles of the upper back arm commence to ache (see Fig. No. 23). The cause of the ache is from constantly contracting and relaxing the muscles.

The contracting and relaxing of the muscles are very similar to the results produced with a sponge held in your hand in a basin of water. When you shut your hand on the sponge the water in it is forced out, because the sponge has been contracted by the aid of the muscles of the forearm, which contracts and closes your fingers on the sponge. Now, when you relax the muscles of the forearm the fingers open, and, the sponge relaxing, creates a suction and draws in the water again ; the muscles all over the entire body act upon the same principle. When a muscle contracts it forces out the in-

nutritious blood and carries with it the waste material which has been thrown off, and carries it through the veins to its proper channels to be disposed of as nature designed; and when the muscles relax, they produce a suction and draw fresh blood from the arteries to replenish, and thus create a vigorous and healthy action in the parts brought into contraction. Thus it is very evident that if we work all the muscles of the entire body in a systematic and scientific manner, we are bound to feel better, look better, think better, and be better men, women, and children, in every sense of the word.

The tendons of the triceps muscles at their lower insertions are attached to the ulna (large bone of the forearm that forms the elbow-joint) a little below the elbow-joint, and at their origin or upper insertions are attached to the humerus (bone of the upper arm) and also one portion is attached to the scapula (shoulder-bone or shoulder-blade) and when in contraction they straighten the elbow-joint.

(SPECIFIC) EXERCISE NO. 3.—DEEPENING THE CHEST.

Stand the back to the "exerciser;" take a handle in each hand; project the arm straight forward of the chest, and with the hands on a level with the shoulders with the palms turned toward the floor; keep the elbows perfectly stiff, with the hands only six inches apart. Then set one foot forward and bend the knee of the forward leg; keep the other one stiff; now bend the body considerably ahead, making the bend from the hips. Be sure and stand far enough forward so that the cross-piece will not strike the top of "exerciser" as the arms move upward. Body erect, hips drawn back, chest projected, shoulders drawn back, head erect, and chin drawn in; this describes the position.

Now for the movement. Let the arms go straight upward and backward as far they will, meantime keeping the hands about six inches apart with the elbows perfectly stiff, and be sure to have the body pitch well forward from

the hips as the arms move upward; otherwise you may feel a little strain in the back, and the chest will lose the benefit of the exercise. (If you allow the arms, which are the levers used to spread open the chest, to bend the back as they go upward, the action will be the same as though the elbows were to bend; the back would get the full force of the movement instead of the chest; and also as a movement for the back it would be a bad one; the back is being bent without any contraction of the back muscles, which action is very liable to prove injurious. It would be very much as if one stood behind you and put one knee on your hips and his hands on your shoulders, and attempt to pull you back by pulling back on the shoulders. By using fifty pounds of force it might hurt your back very much, for the force is bending your back, and not the contraction of your muscles. Now you might bend forward and raise a weight with your back of four times fifty pounds, and still not feel any special strain, because these muscles are in contraction, and thereby holding the bones in their proper positions. It

is the cartilages between the bones that are being ground together by such straining movement which causes the pain.) Now

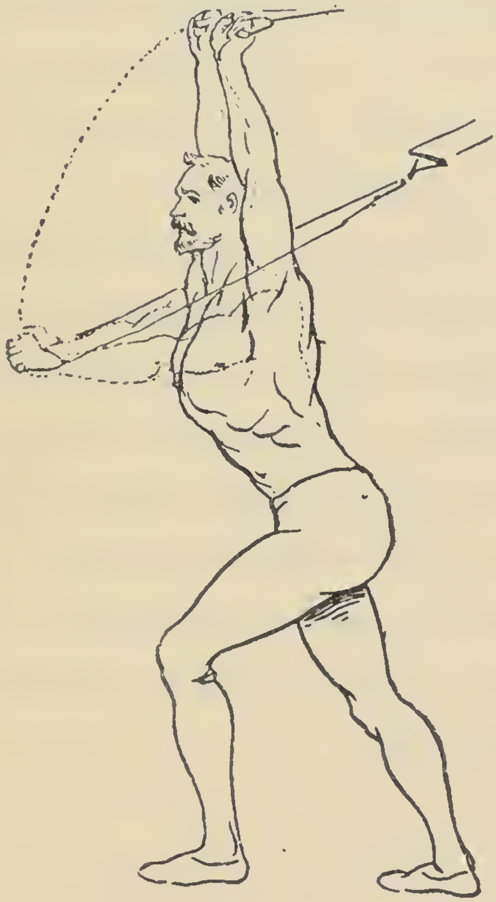


FIG. No. 24.—Deepening the Chest.

bring the arms down again to the position in which they started (see Fig. No. 24).

Take the air in strongly and deeply, through the mouth (if the air be pure and free from dust), as the arms ascend, and expel

it strongly and forcibly as the arms descend; breathe in this way several times, and then take quite a full inspiration, and hold it till you have made ten or twelve movements, or as many as you can conveniently; go through this exercise until you feel that you have tired the chest quite thoroughly.

If you perform this movement just right, you will get the tired feeling at the lower edges of the ribs, for this is the point where they are spread most. This movement is designed to deepen the chest from back to front; the arms, being held straight forward and being pulled upward, would naturally spread the ribs upward and forward, thereby giving depth to the chest.

(SPECIFIC) EXERCISE NO. 4.—LOWER PORTION OF PECTORALIS MAJOR MUSCLES, ON FRONT OF CHEST. (SEE I IN FIG. 25.)

Stand with the right side toward the "exerciser;" grasp both handles in the right hand, with the arm extended horizontally; stand far enough away from "exerciser," so

that when the arm is straightened at full length toward it the cross-piece will not strike at the top. Body erect, hips drawn back, chest projected, shoulders drawn back, head erect, and chin drawn in.

Now, keeping the elbow stiff, bring the arm down toward the side, but a little to the front, so that it will pass in front of and across the body as far as possible without bending the elbow. (If the elbow is allowed to bend, the pectoral muscles will not get the benefit of the exercise, for the force of the movement will go to the crooking of the elbow, as has been explained in the previous exercises.) Then let the arm go up to the horizontal position again (see Fig. No. 25). Make the same movement with the left arm, the left side being toward the "exerciser;" repeat the movement till you tire the muscle. If the hand be placed on the right breast, high up, when the movements are being made with the right arm, the pectoral muscle will be felt to harden when the arm is being pulled down and across the body.

Now, lest you might be misled in regard to

just what muscles are performing this work, I will say that nearly all movements performed without bending the elbow will, in most cases, make the arm ache at the elbow-joint in the

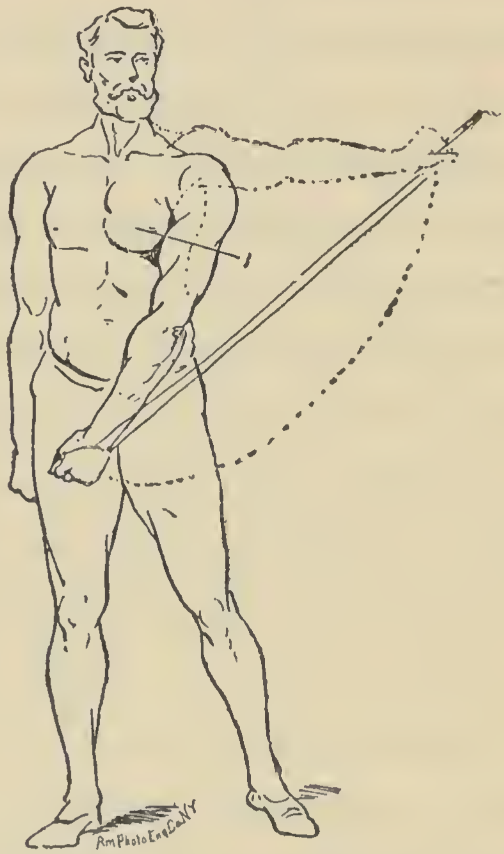


FIG. NO. 25.—Pectoralis Major. (See 1.)

front. This ache is not however caused by the muscles in front of the arm being brought into contraction, but is caused by the stretching of the muscles and tendons brought into action by straightening the arm at the elbow.

(The pectoralis major is a broad, thick, triangular muscle at the upper and fore part of the chest. It arises from the anterior surface of the clavicle (collar-bone), from half the breadth of the anterior surface of the sternum (breast-bone), as low down as the sixth or seventh rib. The fibres of this muscle all terminate in a flat tendon, about two inches broad, and is inserted into the anterior ridge of the humerus. When in contraction the pectoralis major will draw the arm across the front of the chest.)

(SPECIFIC) EXERCISE NO. 5.—DEEPENING THE CHEST FROM THE BACK.

Stand with the back to "exerciser," take a handle in each hand with palms turned to the front, and with the arms hanging straight down by the sides of the body; now step far enough forward from "exerciser" that, when the arms go backward and upward to the highest point possible, the cross-piece will not strike at the top; body erect, hips drawn back, chest projected, shoulders drawn back, head erect, chin

drawn in. Set one foot forward and bend the knee. Be sure to keep the body well forward from the hips and steady during the entire exercise, thus allowing the arms to go higher up, which will open the chest more fully; after the arms have reached the highest point, then bring them back to the sides, and about one foot in front of the body. In this movement be certain that when the arms go back you do not allow them to spread far apart sideways, but to go back and up in a straight line (see Fig. No. 26).

(The reason for this is, if the arms are allowed to spread out at the sides they rise so high sideways that the lower and back part of the chest does not get the benefit of the exercise, but rather the upper part of the chest, which we have special work for in Exercise No. 7.) Inhale the breath deeply and strongly as the arms are going backward and upward, and exhale forcibly as they are coming down and forward. (You may have noticed thus far that I say *in*hale the breath as the arms are going upward; my reason for this is, that when the arms are going up, being at-

tached to the chest-walls (by the muscles, as has been explained in Exercise No. 1) and acting as levers, would naturally raise and expand the ribs, even if no breath were taken in

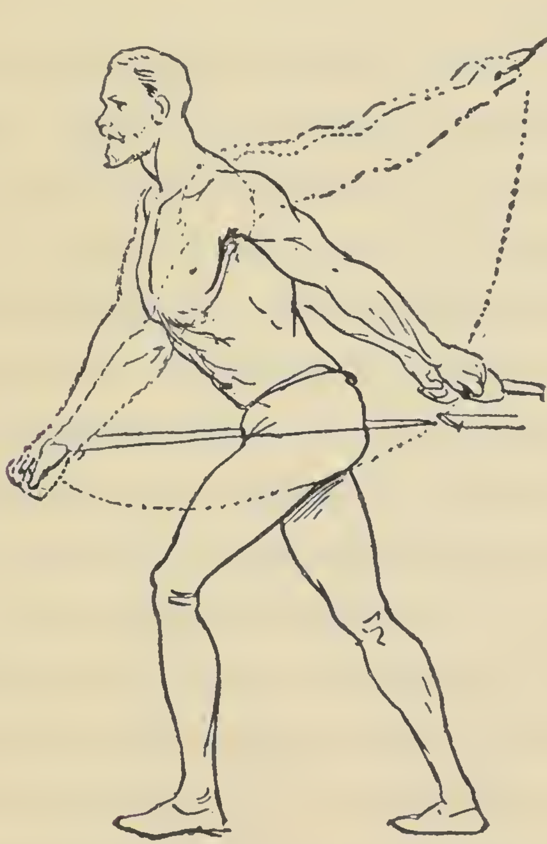


FIG. No. 26.—Deepening Chest from Back.

at the time; but if, while the chest-walls were being spread open by the arms in their ascent, we should take in a deep, strong, full breath, the tendency would be, from the force of the movement, to force the ribs still farther apart,

because there would be an internal pressure brought to bear from the inflation of the lungs.)

NOTE.—Exercises Nos. 1, 3, 5, 7, 9, 11, 13, 15, and 17. These nine exercises are of particular importance to anyone with weak lungs, flat chest, round shoulders, indigestion, dyspepsia; and for the first three months such persons should devote about one-third of the time spent in exercise to these movements, and Nos. 11, 15, and 17 are, most especially, excellent movements for ladies, for they bring into play a very important part of the body, and a part, too, that is usually almost entirely ignored in nearly all systems for physical culture. If one is troubled with sluggish liver, weak stomach, or constipation, these movements for the abdominal muscles, with those for the muscles of the loins of the back, will be found very beneficial, for every such movement brings about a change in the position of the organs in the abdomen, causes more or less intermittent pressure, and thus stimulates the circulation of blood through them.

(SPECIFIC) EXERCISE NO. 6.—LATISSIMUS DORSI ON THE SIDE OF THE BACK. (SEE I IN FIG. 27.)

Stand with the right side toward the "exerciser;" grasp both handles in the right hand, with the arm extended horizontally; stand far enough away from "exerciser" that when the arm is straightened at full length toward it the cross-piece will not strike at the top; body erect, hips drawn back, chest projected, shoulders drawn back, head erect, and chin drawn in; set one foot forward and bend the knee. Now, keeping the elbow stiff, bring the arm down toward the side, but a little backward, that the arm will pass back of and across the body as far as possible without bending the elbow; then let the arm go up to the horizontal position again (see Fig. No. 27).

Make the same movements with the left arm, the left side being toward the "exerciser;" repeat the movement until you have tired the muscle named. (The latissimus dorsi is a large muscle that forms the larger part of that

fleshy mass on the sides of the back from the pit of the arm down to the lower ribs, and it very nearly corresponds in its action on the back to the pectoral muscle on the front. The

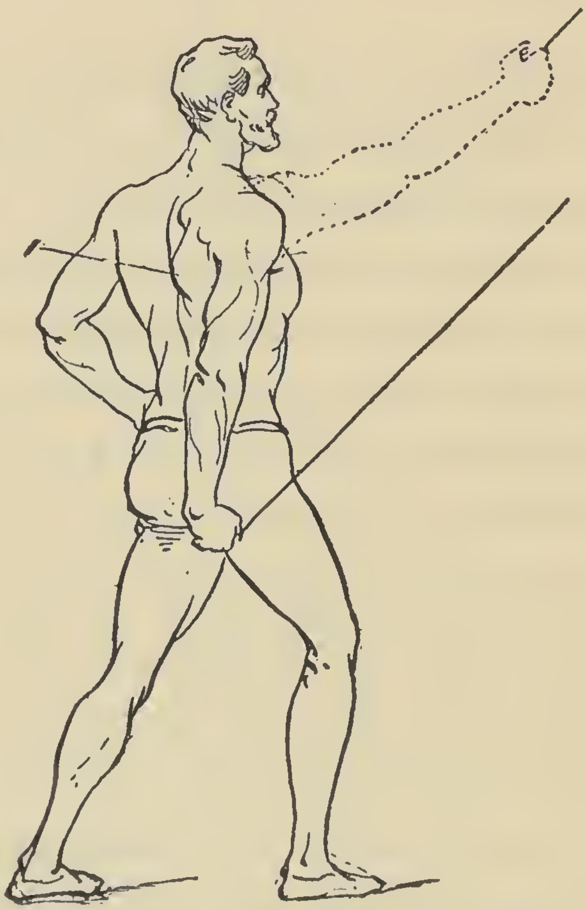


FIG. No. 27.—Latissimus Dorsi. (See I.)

attachment of this muscle is to the upper part of the humerus (bone of the arm) near the shoulder, and at its lower attachment, the lower part of the ribs; when in contraction it pulls the arm from an upward position down-

ward and across the back close to the body, and from a forward position round and back of the body.

(SPECIFIC) EXERCISE NO. 7.—UPPER PORTION OF PECTORALIS MAJOR MUSCLE, ON UPPER PART OF CHEST. (SEE I IN FIG. 28.)

This is also a splendid exercise for deepening the chest and straightening back the shoulders, as well as for developing the upper portion of the pectorals. Stand with the back to "exerciser," one foot forward at a convenient and easy distance, with the knee bent; grasp the handles in either hand, with the arms extended straight forward and on a level with the shoulders, the hands nearly touching each other; body erect, one foot advanced, hips drawn back, chest projected, shoulders drawn back, head erect, chin drawn in. Then let the arms go backward as far as they can go comfortably (taking care that the motion is not so sudden as to wrench the shoulders; and be sure, when the arms go back, that they be kept fully as high as the shoulders, otherwise

the shoulders will not receive the benefit, straightening them being the object in view); bring the arms forward again to the point

FIG. NO. 28.—Upper Portion of Pectoralis Major Muscles. (See 1.)

where they started, and when they are coming forward, see that the handle-cord passes above the shoulders (see Fig. No. 28).

Repeat the movement till you tire the par-

ticular muscles mentioned; when the arms go backward, inhale as deeply as possible, and when they are coming forward, exhale forcibly. (The great majority who are not stoutly built, and without well-developed pectoral muscles, have at the upper edge of the pectorals and along the lower edge of the collar-bone a decidedly hollow place, and they will find this a good exercise, if persevered in, for filling out those hollow places; but the movement must be done accurately and thoroughly in order to gain the best and quickest results, and as often as five or six times a week. (This same rule applies to all other exercises given in this book.)

(SPECIFIC) EXERCISE NO. 8.—MUSCLES OF THE FOREARM. (SEE 1 AND 2 IN FIG. 29.)

The muscles of the forearm are used in flexing and extending the hand, bending the same at the wrist, and also flexing and extending the fingers. Facing the "exerciser," grasp the handles, one in each hand, with the arms in front raised to nearly a level with the shoul-

ders, and with the hands in such a position that the thumbs will be uppermost and the little-finger side of the hands turned toward the floor; body erect, one foot advanced, hips drawn back, chest projected, shoulders drawn back, head erect, and chin drawn in.

Now bend the hands at the wrists inward toward each other as hard as you can, and then bend them back to the straight position again; perform this movement with the hands until you make the inside, or the fleshy part of the forearm, ache quite thoroughly (see 1 in Fig. No. 29).

Now start from the straight position and bend the hands backward as hard as possible; then bring them to the straight position again; repeat this movement until you tire the back portion of the forearm muscles (see 2 in Fig. No. 29).

(These movements may seem so slight that they cannot be of much avail, but in moving the hand backward and forward the forearm muscles are doing exactly the work that nature intended, and if we give them plenty of the work nature designed (in a systematic man-

ner) they must of necessity develop to the fullest extent. A fine exercise for developing the grip can be got by shutting the hand tightly on a stiff rubber-ball. The strength-

FIG. NO. 29.—Muscles of the Forearm. (See 1 and 2.)

ening of these forearm muscles is of much value to the piano player. One can most certainly, with strong muscles, play longer and more forcibly than with weak ones. The tendons of the forearm muscles are, at their upper insertions, attached to the bones of the

arm near the elbow-joints, and at the lower insertions some of them are attached to the bones of the hands, while the tendons of others are attached to the bones of the fingers.)

(SPECIFIC) EXERCISE NO. 9.—POSTERIOR TRICEPS, INNER SIDE OF UPPER BACK ARM. (SEE I IN FIG. 30.)

Stand facing the "exerciser;" grasp the handles, one in each hand, with the palms turned up and the arms extended horizontally in front of the body; stand far enough away so that when the arms are extended at full length the cross-piece will not strike at the top of "exerciser;" set one foot forward and bend the knee, and pitch the body slightly in advance, bending at the hips; bring the arms from the horizontal position down in a straight line to the sides of the body, and see that the palms are still turned to the front.

From this position rotate the whole arm from the shoulder round and back of the body, so that the backs of the hands will approach each other (see Fig. No. 30).

Let the arms go up again to the horizontal

position ; repeat this movement until you feel the inner back portion of the upper arm ache, which is the posterior portion of the triceps muscles on the back of the arm. Take in the

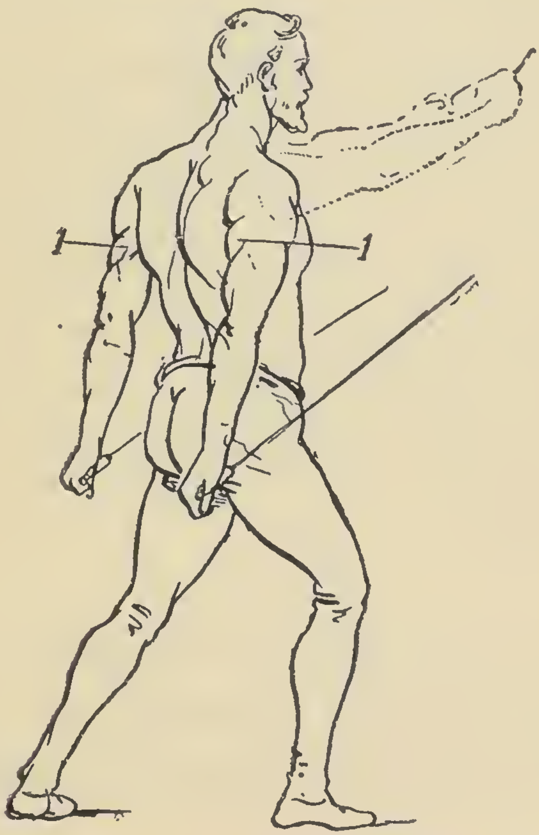


FIG. No. 30.—Posterior Triceps. (See 1)

breath quickly and deeply as the arms are going from the horizontal position downward and backward. Exhale forcibly as the arms go upward ; breathe in this way a few times ; then take in a deep, full breath, and hold it while you make ten or a dozen movements, or as many

as you can conveniently. (The tendons of this portion of the triceps muscles, at their lower insertion, are attached to the ulna (bone of the forearm) at the elbow, and at their upper insertion it is attached to the scapula (shoulder-blade), unlike the lateral portion, which is attached to the humerus near the shoulder-joint. This posterior portion, being attached to the shoulder-blade, gives to the arm this peculiar rotary motion which you must strive to get in this exercise, if you wish to improve the development of that portion of the arm.)

(SPECIFIC) EXERCISE NO. 10.—FIRST ACTION OF STERNO-MASTOID MUSCLES ON SIDE AND FRONT OF NECK. (SEE I IN FIG. 31.)

Stand with the right side toward the "exerciser;" take both handles in the left hand, which is the hand farthest away from "exerciser." Now place the left hand, that holds the handles, on the top of the head, with the wrist and forearm pressing against the side of the head. Now pull the head from the

erect position sideways over the left shoulder. Let the weight pull the head back again sideways over the right shoulder. Take care that the work be done by the muscles of the

FIG. No. 31.—Sterno-Mastoid. (See 1.)

neck, and not by the arm holding the handles, nor by the body bending at the sides of the waist (see Fig. No. 31). Continue this movement until you tire the muscle on the left side of the neck; then. reverse the position,

with the left side turned to "exerciser," with the right hand grasping the handles and placed on the head. Continue the movement until you have tired the muscle on the right side of the neck. (A fine, shapely neck is something we very rarely see. A small neck always looks weak, and we get the impression from it that the individual is weakly and with little life-force, and certainly no part about an individual, be it ever so slender and delicate, would make one appear so insignificant as a slender and delicate-looking neck. The tendons of the sterno-mastoid muscles, at their lower insertions, are attached to the clavicle (collar-bone) at the points above where the collar-bone is attached to the sternum (breast-bone) and are attached, at their upper insertions, to the cranium back of the ears.) When in contraction they move the head from side to side and forward, and also give it a twisting motion.

(SPECIFIC) EXERCISE NO. II.—RECTUS ABDOMINALIS MUSCLES ON THE FRONT OF ABDOMEN. (SEE I IN FIG. NO. 32.)

Stand with the back to "exerciser;" take both handles, and bring them from behind up over the head and far enough forward that, when you hold them both together, one on top of the other, you can look through between the wooden and wire part of the handles. Then put the thumbs of both hands up through the space between the wooden and wire part of the handles, so that the backs of the hands are turned toward the ceiling. Now place the hands, with the handles, on top of the head, and hold them there steadily. Now step far enough forward (with one foot in advance, bend the knee and also pitch the body forward, bending at the hips) from "exerciser" so that, when the body is bending backward, the cross-piece will not strike at the top. (If one is troubled with a weak or lame back it is not well to bend too far backward in this movement, but as far as you

can without feeling it too strongly in the back.)

Now for the movement. Bend forward as

FIG. No. 32.—Rectus Abdominis. (See 1.)

far as possible (keeping the back leg stiff at the knee), with a bowing motion, the body bending only at the hips, and then let the body straighten and go backward as far as possible (see Fig. No. 32). Repeat this

movement till you feel that you have tired the muscles on the front of abdomen. Inhale the breath deeply as the body goes forward and downward, and exhale forcibly as the body is rising and going backward.

This exercise is an especially good one for persons troubled with dyspepsia, constipation, and a sluggish liver, because the circulation is thus drawn more directly to those parts than without such an exercise. (The tendons of the rectus abdominis muscles, at their lower insertions, are attached to the central portion of the pelvis (hip) bone; and at their upper insertions to the lower point of the sternum (breast-bone), and when in contraction they pull the body forward, bending at the hips.)

(SPECIFIC) EXERCISE NO. 12.—STERNO-MASTOID MUSCLES; THEIR FORWARD ACTION. (SEE 1 IN FIG. NO. 33.)

Stand with the back to the "exerciser;" seize both handles and bring them from behind up over the head, and far enough forward so that, when you hold them together,

you can look through them between the wooden and wire part of the handles. Put the thumbs of both hands up through the space between the wooden and wire part of

FIG. No. 33.—Sterno-Mastoids. (See 1.)

the handles, so that the backs of the hands are turned toward the ceiling. Then place the hands, with the handles, on top of the head, and hold them there steadily. Now step far enough forward (one foot in advance, and

bend the knee while you pitch the body forward, bending at the hips) without letting the cross-piece strike at the top when the head is moving backward.

Now for the movement. Bend the head forward as far as you can till the chin will almost touch the collar-bone. Then let the head swing straight, as shown in Fig. No. 33.

Take care that the work is done by the muscles in front of the neck, and not by the hands holding the handles nor by the body bending forward at the hips, but keep the body rigidly straight, allowing only the head to move backward and forward. Continue this movement until you tire the muscles on the front of the neck. The insertion of these muscles has already been given in Exercise No. 10. When these muscles are in contraction they pull the head from a backward position forward, from side to side, and they also turn the head so that the face will be in line with either shoulder, making a sort of twisting movement of the head.

EXERCISE NO. 13.—RHOMBOIDEUS MIDDLE TRAPEZIUS (SEE I IN FIG. NO. 34) AND POSTERIOR DELTOID MUSCLES, BETWEEN THE SHOULDER-BLADES.

Stand facing the "exerciser;" grasp the handles in each hand, with the palms turned up and the arms extended horizontally in front of the body; stand far enough away so that, when the arms are extended at full length, the cross-piece will not strike at the top of "exerciser." Set one foot forward, and bend the knee; pitch the body slightly forward, bending at the hips.

Next bring the arms from the horizontal position at the front, straight round to a horizontal position at the sides, keeping the hands on a level with the shoulders, with the elbows straight, and carry the arms even farther back in that position, if possible. Now let the arms go forward again to the position they started from (see Fig. No. 34).

Repeat this movement till the muscles ache—being the ones between the shoulder-blades

on the back. Inhale deeply as the arms go from the front to the back, and exhale forcibly as they go to the forward position. (The ten-

FIG. No. 34.—Rhomboideus Lower Trapezius. (See 1.)

dons of the trapezius muscle, at its upper insertion, are attached to the lower edge of the back of the cranium, and at its lower insertion; and thence down, is attached all along the spine to the twelfth dorsal vertebra. It is also at-

tached to the clavicle or collar-bone, and to the spine of the scapula (shoulder-blade). The lower point in the back is about at the twelfth rib.

This trapezius muscle has fibres running in three different directions; therefore it will take at least three special exercises to develop it in its entirety. This exercise is mainly for the lower portion, and is aided by the rhomboideus muscles, which pass underneath the trapezius, and are attached to the shoulder-blade, and from the seventh to the eleventh vertebra of the spine.

(SPECIFIC) EXERCISE NO. 14.—SERRATUS MAGNUS MUSCLES, ON THE SIDES OF THE BODY UNDER THE ARMS. (SEE I IN FIG. NO. 35.)

This will probably be a rather difficult movement for one to get just the right knack of at first; but with a little perseverance you will soon have no trouble with it. It is a very slight movement; nevertheless, it is sufficient to bring this muscle to a full state of development.

Turn your back to the "exerciser;" grasp the handles in each hand (the little-finger side of the hand turned toward the floor) and extend the arms horizontally in front of the body, with the elbows straight and the hands about on a level with the shoulders; step far enough forward (and set one foot forward, with knee bent) so that the cross-piece will not strike above.

Now, if you have the position of the arms right, make an effort to push them a few inches farther forward, making a movement only from the shoulders; and then attempt to bring the shoulder-blades together in the back, thus drawing the arms back again. (You will find in drawing the arms back an almost irresistible tendency to bend the elbows; but you must not allow them to bend, for reasons explained in former exercises; but the arms are to move straight forward and backward, from the shoulders (see Fig. No. 35).

(This serratus magnus muscle, at its forward attachment on the sides of the body, is attached from the first to the eighth rib, in-

clusive, and at its back attachment to the lower and side surface of the shoulder-blade. It is a broad, flat, thin muscle, and when in contraction moves the shoulder-blade forward

FIG. NO. 35.—Serratus Magnus. (See 1.)

and upward in a sort of rotary motion; and the shoulder-blades, being attached to the arms, when the blades are being moved outward the arms must of necessity be pushed forward at the same time; after the arms have been moved forward and the serratus mus-

cles relaxed, the weight will pull the arms backward.)

(SPECIFIC) EXERCISE NO. 15.—OBLIQUUS ABDOMINIS MUSCLES, ON THE SIDES OF THE ABDOMEN. (SEE I IN FIG. NO. 36.)

Stand with right side toward the "exerciser;" take both handles in the left hand, which is the one farthest from the "exerciser;" place the left hand, with the handles, on the top of the head, and let the wrist and forearm press against the top and side of the head. Stand far enough away so that, when the body moves toward the "exerciser," the cross-piece will not strike at the top. This describes the position.

Now for the movement. Let the body move sideways and away from the "exerciser," bending at the hips to let the body go as low as possible; then straighten, and move the body sideways and toward "the exerciser" (see Fig. No. 36).

Repeat this movement till the muscle is tired on the right side of the abdomen; and

then change to the left side, and do the same. As the body is lowering at the side, inhale the breath strongly, and when the body is

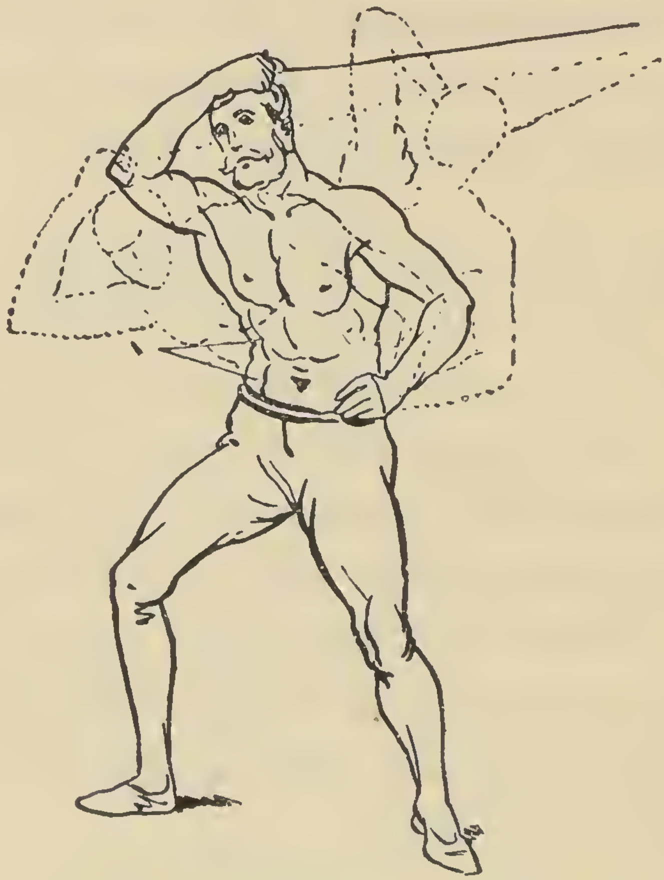


FIG. No. 36.—Obliquus Abdominis. (See 1.)

rising and moving toward "the exerciser," exhale forcibly.

Breathe this way a few times, and then take quite a full breath, and hold it while you make ten or a dozen movements, or as many as you can, conveniently. (This is a very valuable

exercise for anyone troubled with dyspepsia, constipation, and biliousness.

(These obliquus abdominis muscles are large, broad, flat muscles, covering the sides of the abdomen ; at their lower insertions they are attached to that part of the hip-bone called the ileum, and at their upper insertion are attached to the ribs near the lower edges of the pectoralis major muscles, and, in fact, all the way down to the lower borders of the eight inferior ribs ; and when in contraction (one side at a time) they pull the body over, bending at the hips sideways, over the hip.)

(SPECIFIC) EXERCISE NO. 16.—UPPER PORTION OF TRAPEZIUS MUSCLE ON BACK OF NECK. (SEE I IN FIG. NO. 37.)

Stand facing "exerciser ;" take both handles, one on top of the other, and insert the thumbs of both hands (from under side) through the space between the wooden and wire part of the handles, so that the thumbs will be turned toward the floor and the backs

of the hands toward the ceiling ; now, with the hands grasping the handles in this way, bring the handles to the top of the head, and hold them there steadily. Stand far enough away

FIG. No. 37.—Upper Trapezius. (See I.)

from " exerciser " that the cross-piece will not strike at the top when the head goes forward ; this describes the position. Now for the movement.

Pull the head backward as far as possible,

and then let it go forward toward "the exerciser," letting the head drop forward so that the chin will move toward the clavicle (collar-bone). (See Fig. No. 37.)

(In this exercise see that the muscles on the back of the neck are doing the work instead of other muscles on the back. The body should be inclined forward from the hips, with one foot in advance and the knee bent, the body kept perfectly rigid, and the movement made only with the back muscles of the neck, which contract and pull the head backward. The attachments of this part of the trapezius muscle, at its upper insertion, are to the back part and lower edge of the cranium, and are attached from this point along the spine, as has been explained in Exercise No. 13.)

(SPECIFIC) EXERCISE NO. 17.—ERECTOR SPINÆ MUSCLES OF THE LOINS. (SEE I IN FIG. NO. 38.)

Stand facing "exerciser;" take both handles, one on top of the other, and insert the thumbs of both hands (from under side)

through the space between the wooden and wire part of the handles, so that the thumbs will be turned toward the floor and their

FIG. No. 38.—Erector Spinæ. (See I.)

backs toward the ceiling. With the hands grasping the handles in this way, bring them to the top of the head, and hold them there firmly. (Stand far enough from "exerciser"

that, when the body bends forward, the cross-piece will not strike the top.) Now let the body move forward (bending at the hips only); then straighten and bend back as far as possible (keeping both knees straight), bending only at the back. One foot should be set forward of the other, with the knee bent (see Fig. No. 38).

Inhale deeply as the body is moving forward and downward, and exhale strongly as it is moving upward and backward. Now this movement is another especially good one for those troubled with dyspepsia, constipation, and, in fact, for nearly all ailments in the region of the back and abdomen, and is particularly effective for those troubled with a lame back. (These erector spinæ muscles are attached along the vertebræ, and also to the ribs and the pelvis (hip-bone); and when in contraction they hold the spine erect and also bring it from a forward bent position to a backward bent position, as is represented in Fig. No. 38.)

(SPECIFIC) EXERCISE NO. 18.—THE STRIKING MUSCLES.

These comprise the triceps, the anterior and lateral portion of the deltoid, the pectoralis major, the serratus magnus, and the obliquus abdominal muscles.

Stand with back to "exerciser;" grasp the handles, one in each hand, with the elbows at the sides of the body; stand far enough from the "exerciser" so that, in the backward movement of the arms, the cross-piece will not strike the top; set one foot forward, and bend the knee; pitch the body a little forward, bending at the hips. Hold the body erect, chest forward, shoulders drawn back, head erect, with the chin drawn in. This describes the position. Now for the movement.

Extend the arms straight forward, as far as possible, and on a level with the shoulders, and then draw them back *in the same line as they went out.* Let the elbows go back as far as possible (see Fig. No. 39).

This movement can be made more of a

striking exercise if both handles are taken in one hand and the movement made with one arm instead of two; but it is a rather better

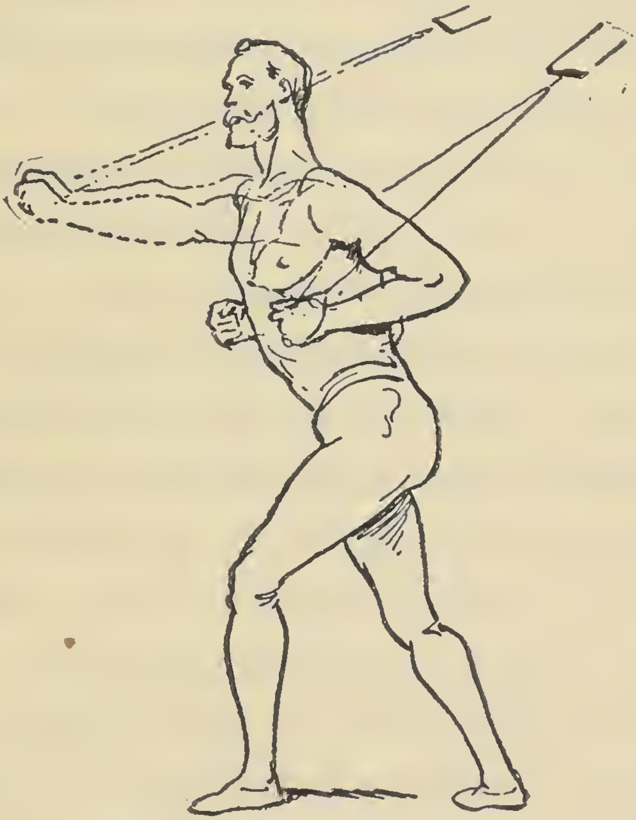


FIG. No. 39.—Striking Muscles.

exercise for drawing the shoulders back to use both arms.

The ordinary straightforward blow from the shoulder is really a weak blow compared to a blow struck in a scientific manner. (An ordinary blow coming straight from the

shoulder brings into play only *two* muscles; the anterior portion of the deltoid, which brings the whole arm to a level with or above the shoulder, and the triceps muscles, which straighten the elbow at the same time that the deltoid muscle is raising the arm.)

Now, if a blow be struck in a thoroughly scientific manner, there will be *five* muscles brought into action instead of two.

Now let us analyze what we call the scientific blow. After the position of the arm has been taken, the first movement to be made, as has already been explained, the deltoid muscle of the shoulder raises the arm, while the triceps muscles straighten the elbow. If, at the same time the arm is carried a little across the body (instead of straight out from the shoulder), we bring into action the powerful pectoralis major muscles of the chest, and at the last point of the blow, by bringing into action the serratus magnus muscle, which draws the shoulders forward some five or six inches, by which we gain additional power and reach, and, at the same time, if we bring into play the powerful obliquus abdominal

muscles, by turning the shoulder square to the front when the arm is going out, we gain tremendous power and also several inches more of reach. This may seem to be rather a complicated movement; but you can bring all these muscles into contraction at once, as easily as any one of them, and make it a lightning-like movement.

Exercises from 1 to 18, inclusive, are all to be done with the handles attached to the top of "exerciser," and all succeding exercises are to be done from lower attachment to the floor.

(SPECIFIC) EXERCISE NO. 19.—FLOOR PULLEY—MIDDLE PORTION OF TRAPEZIUS MUSCLE, BACK OF SHOULDERS. (SEE 1 IN FIG. 40.)

Take the end of the long cord running through the floor pulley, and attach it at the top of "exerciser" where the pair of handles are attached (first removing the handles); then stand with face to "exerciser," and close to it. Hold with both hands the long handle attached to the cord running through the floor

pulley. Holding the handle in front of the body, with the arms straight, lift the shoulders up as high as possible, making a movement called shrugging (see Fig. No. 40).

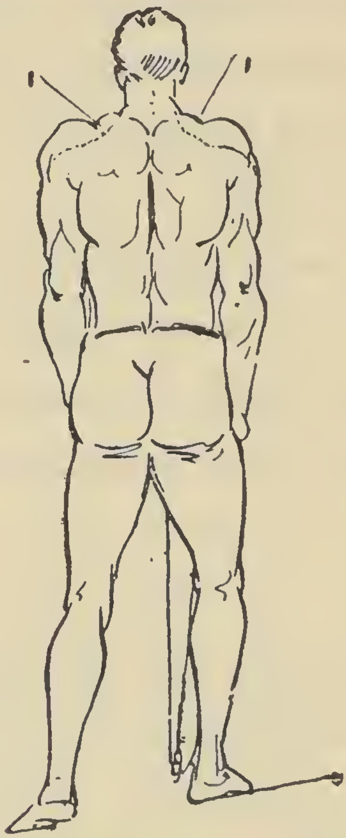


FIG. NO. 40.—Middle Trapezius. (See 1.)

Continue the movement of shrugging the shoulders until you feel that you have tired the muscles on the lower and back part of the neck and shoulders. Then reverse the position, turning the back to "exerciser," and go through the same performance, holding the

handle back of body. (The attachments of this portion of the trapezius muscles are at the upper part of the spine and also to the collar-bone from a point along the shoulder, and to the neck; and when in contraction they pull the shoulders upward and inward toward the neck. It is essential that this portion of the trapezius muscle should be developed, if one wishes to develop the upper portion of shoulder and lower portion of neck, for the two are blended together at this point.)

(SPECIFIC) EXERCISE NO. 20.—ANTERIOR DELTOID MUSCLES ON FRONT PART OF THE SHOULDERS. (SEE I IN FIG. NO. 41.)

Stand facing the "exerciser" (take the handle with both hands), close to it, but far enough away so that your hands will not come in contact with it as they are passing upward; hold the arms perfectly rigid and straight, and carry them directly forward and upward as high as the head; then lower and repeat till you tire the muscles named (see Fig. No. 41).

Inhale fully as the arms ascend, and exhale

forcibly as they descend. (The insertion of this portion of the deltoid muscles at their lower point is to the bone of the upper arm a few inches below the shoulder-joint, and at its

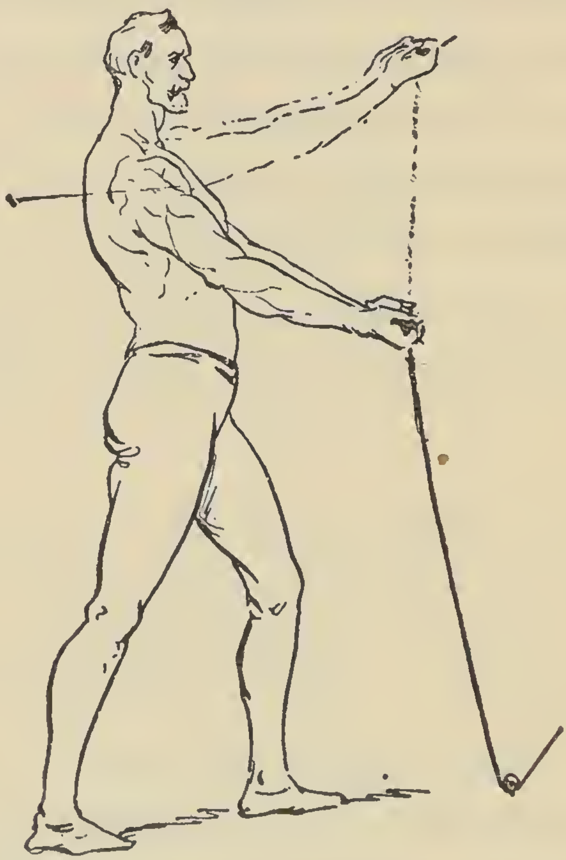


FIG. No. 41.—Anterior Deltoid. (See I.)

upper insertion is attached to the bone of the shoulder. When this portion of the deltoid is in contraction it pulls the arm from a position at the side or at the front of the body straight out forward and upward.

While this is a good exercise for developing a portion of the shoulder, it is also a splendid movement for the chest and lungs, spreading the ribs as the arms are raised upward, and thus opening the chest, which enables one to take in a larger volume of air than it would be possible without the movement, more especially in the upper part of the lungs, at the point where consumption is most likely to set in.

(SPECIFIC) EXERCISE NO. 21.—BICEPS OF ARM, MUSCLE ON THE FRONT PART OF UPPER ARM. (SEE 1 IN FIG. 42.)

Stand facing "the exerciser;" grasp the handle in both hands, with the palms turned up to the ceiling; bring the elbows close to the body in front, and hold them there firmly while going through the movement. Now flex the arms at the elbows, carrying the hands up near to the shoulders without moving the elbows away from the body (see Fig. No. 42).

(Stand with both feet together, the hips drawn well back, chest projected, head erect,

with the chin drawn in.) Perform this movement until you tire the large muscles on front part of upper arm. (The tendons of the biceps muscles, at their upper insertions, are at-

FIG. No. 42.—Biceps of Arm. (See 1.)

tached to the bone of the shoulder near the joint, and at their lower insertions to the bone of the forearm near the elbow-joint, and when in contraction they pull the forearm up toward the upper arm ; they also act in rotating the forearm.)

(SPECIFIC) EXERCISE NO. 22.—ERECTUS SPINALIS (SEE I IN FIG. NO. 43) AND THE HAM-STRING MUSCLES OF THE BACK OF THE THIGH.

Again stand facing "the exerciser." Bend over and seize the handle of the cord running through the floor pulley with both hands, the palms turned toward the floor. Stand away from "exerciser" so that, when the body bends forward, the cross-piece will not strike at the top. Stand erect with the feet together, chest projected, head erect, and chin drawn in.

Now for the movement. Keeping the elbows and knees perfectly rigid, bend the body forward from the hips toward the floor as far as you can, and then straighten to the erect position, and bend as far backward as possible. While going through the movement the arms should be kept perfectly rigid and on a level with the shoulders (see Fig. No. 43).

The object of keeping the arms on a level with the shoulders is to give the muscles more leverage to overcome, thereby making an exercise that will give better satisfaction to the performer.

Inhale the breath deeply as the body goes forward and downward, and exhale forcibly as it is rising upward and backward. (The reason for taking the breath in as the body

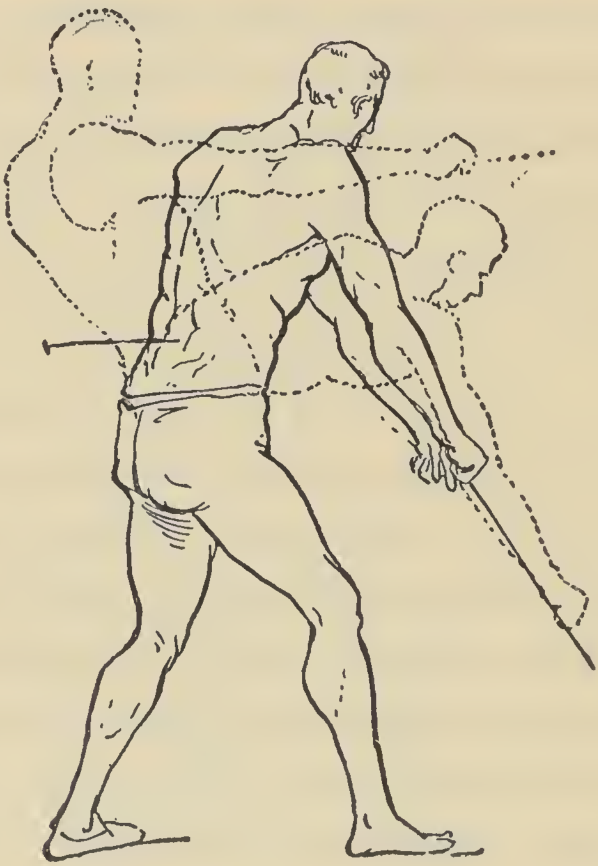


FIG. No. 43.—Ham-String Muscles and Erector Spinæ. (See 1.)

goes forward and downward in these movements in this manner is, that when the body is going forward and downward the muscles of the abdomen and chest are all relaxed; consequently the ribs are more easily spread by a deep inhalation.

Now, when the body is rising, but more especially when tipping backward, the muscles of the abdomen which are attached to the breast-bone and lower part of the chest are brought into contraction, and thus flatten in the ribs so that it becomes impossible to take in a very deep inhalation; but it aids it very materially in exhaling the breath.

The erector spinæ muscles have already been spoken of in Exercise No. 17. The attachments of some of the ham-string muscles, at their upper insertions, are to the bone of the pelvis from behind and to the bone of the leg just below the knee-joint; and when in contraction, if the body is bent forward, they bring it to an upright position. If care is taken, when the body is rising, to bend well backward, this exercise will be found to be very effective for strengthening weak backs; but you must not bend back so far in these exercises that the exercise will hurt the back while you are performing; but bend as far back as you can conveniently, without feeling any special strain in the back, and you will gain the quickest and best results.

(SPECIFIC) EXERCISE NO. 23.—POSTERIOR DELTOID, BACK PORTION OF THE SHOULDER-MUSCLE. (SEE 1 IN FIG. NO. 44.)

Stand facing "exerciser," and close to it. Slip the handle out of the cord, take the end of the cord in right hand, and step a little to the left side of the floor pulley. Set the foot that is next to the rope forward (the right foot), and carry the arm straight backward and upward, as high as possible.

Be sure to keep the little-finger edge of the hand (as the arm is moving upward) turned toward the ceiling. Repeat this movement until you tire the muscle named (see Fig. No. 44); and then change to the other arm, and do likewise.

The position of the body assumed in this exercise is with the foot which is next to the cord always set forward, the body pitched forward from the hips so as to admit of the arm rising higher; the chest projected, the head erect, and the chin drawn in. (The tendons of this portion of the deltoid muscle, at

their upper insertions, are attached to the back part of the scapula (bone of the shoulder), and at its lower insertion to the humerus (bone of the arm) a few inches below the

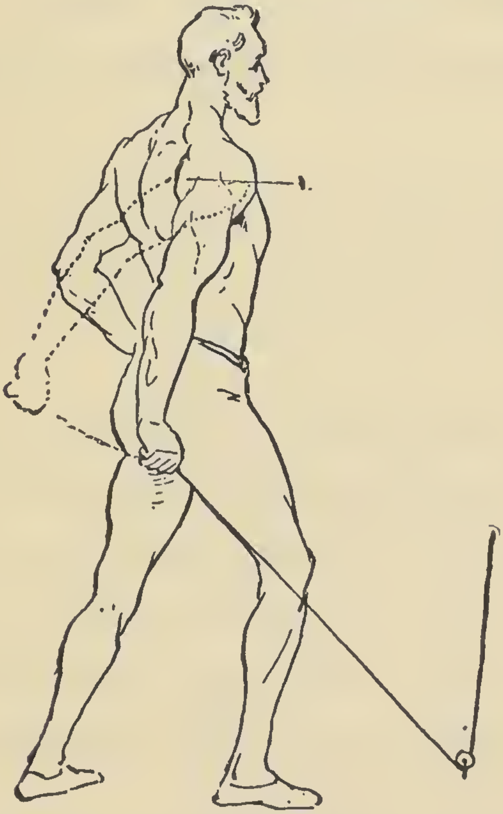


FIG. No. 44.—Posterior Deltoid. (See 1.)

shoulder-joint; and when in contraction it carries the arm straight backward and upward.

(The reason for setting the right foot forward when we are using the right arm is not to allow the body to swing to the side as the

arm is moving backward, and thus bring into play the lateral portion of the deltoid instead of the posterior. The same reason is assigned for keeping the little-finger edge of the hand turned toward the ceiling; the arm must not rotate, but be carried straight up.)

(SPECIFIC) EXERCISE NO. 24.—QUADRICEPS EXTENSOR MUSCLES, ON FRONT OF THIGH. (SEE I IN FIG. NO. 45.)

Stand facing the "exerciser," and close to it; grasp the handle with both hands, keep the arms rigid, do not allow the elbows to bend; lower the body as near the floor as possible, bending only at the hips and knees; then raise the body to an erect position each time (see Fig. No. 45).

Stand far enough back so that, when the body is lowering, the cross-piece will not strike at the top. Inhale deeply when the body is lowering, and exhale strongly when the body is rising. Repeat this exercise until you feel you have tired the muscles which are on the front of the thigh. The position is

with the feet together, the body erect, the chest projected, head erect, with the chin drawn in. (When we are performing this movement we are probably bringing more mus-

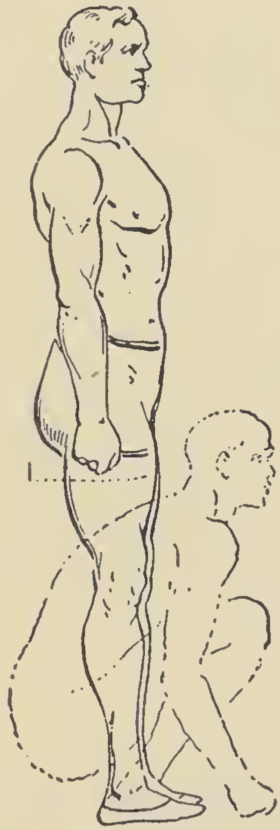


FIG. NO. 45.—Quadriceps Extensor. (See I.)

cular tissue into contraction than in any other given in this book. We are contracting at least four pairs of very large muscles, since we are drawing a larger quantity of the circulation through the lungs to supply these muscles; hence we must supply a larger quantity

of oxygen to the blood as it passes through the lungs.

(This is the reason why I make this a special breathing movement, and not because it has any particular relation to the chest.) The tendons of the quadriceps muscles are some of them attached to the bone of the leg near the hip-joint, and others to the pelvis bone near the joint also. (This is a four-headed muscle. At its lower insertion this quadriceps muscle converges with a large tendon, and is fastened to the bone of the lower leg just below the knee-joint in front; and when in contraction they straighten the knees, thus raising the body.)

(SPECIFIC) EXERCISE NO. 25.—LATERAL DELTOID, SIDE PORTION OF THE DELTOID MUSCLE OF THE SHOULDER. (SEE I IN FIG. NO. 46.)

Stand with the left side toward the "exerciser," and step back a trifle so that you will be a little to one side of it. Take the handle in the right hand (with the left side still parallel

with the "exerciser"), and the palm turned toward the floor. Now, with feet together, body erect, chest projected, head erect, and chin drawn in, carry the arm straight out

FIG. No. 46.—Lateral Deltoid. (See 1.)

from the side of body and upward as high as you well can (see Fig. No. 46).

Then lower the arm to the same position, and repeat the movement until you tire the shoulder-muscle of the right arm; and then

change to the left arm, turning the right side toward the "exerciser," and exercise the same as with the right arm. (The tendons of this portion of the deltoid muscle, at its lower insertion, are connected with the anterior and posterior portion of the deltoid, and is attached to the humerus (bone of the upper arm) a few inches below the shoulder-joint, and at its upper insertion to the scapula (bone of the shoulder) ; and when in contraction it moves the arm outward and upward from the side of the body.

(Of course, performing any one of these three movements given for the deltoid muscles would bring into contraction, to some extent, the other two portions of the muscle, for they all three aid each other in their special work; but we can bring them to a more perfect symmetrical development by exercising each one of them separately than is possible with one exercise for the three.)

(SPECIFIC) EXERCISE NO. 26.—GASTROCNEMIUS AND SOLEUS, MUSCLES OF THE CALF. (SEE I IN FIG. NO. 47.)

While facing the "exerciser," and close to it, bend over and grasp the handle in both hands; stand with the feet together, the body erect, chest projected, shoulders drawn back, head erect, with chin drawn in. This describes the position; now, with the arms hanging straight in front, holding the handle, raise the heels as high as possible, poising the weight on the toes (see Fig. No. 47). Then let the heels lower to the floor again, and perform this movement until you tire the muscles named. Now, in order to gain the quickest and best results from this exercise, you must rise high on the toes each time, and not slight the movement by rising partly up, as most people do in this exercise. (The tendons of the calf-muscles, at their upper insertions, are attached to the femur (bone of the upper leg), and at their lower insertions they converge to and from the tendon Achillis,

which is attached to the os calcis (the bone of the heel) ; and when in contraction they raise the heels from the floor, thus precipitating the whole weight of the body on the ball of the

FIG. NO. 47.—Gastrocnemius and Soleus. (See 1.)

foot, or the toes. This muscle will be aided very materially in its development if you take pains, while walking, before lifting the foot, to press the toes firmly on the ground as they

are leaving it for the next step; in other words, in walking rise well on the toes.)

(SPECIFIC) EXERCISE NO. 27.—TIBIALIS ANTICUS MUSCLE OF THE FRONT OF THE LOWER LEG. (SEE 1 AND 2 IN FIG. NO. 48.)

Stand facing the "exerciser," and close to

FIG. NO. 48.—Tibialis Anticus. (See 1 and 2.)

it; the handle in both hands, feet together, body erect, chest projected, shoulders drawn

back, head erect, with the chin drawn in. Then raise the foot, shifting the weight of the body on the heels; then lower the feet to the floor again, and repeat this exercise until you have tired the muscle named (see Fig. No. 48). In this movement the "exerciser" is not of much use, only to steady one while performing it. (The tibialis anticus, at its origin, is attached to the tibia (bone of the lower leg) near the knee-joint at the side, and the tendon, at its lower insertion, is attached to the cuneiform and metatarsal bones (forming the first joint of the great toe). When this tibialis anticus muscle is in contraction, it flexes the foot on the lower leg.

(SPECIFIC) EXERCISE NO. 28.—GLUTEUS MAXIMUS, LARGE MUSCLES OF THE HIPS. (SEE 1 IN FIG. NO. 49.)

Now we make a change from the handle to the foot-strap. You will get a correct idea of what I mean by the foot-strap if you look at the engraving of the "exerciser" in Plate No. III. It is the strap hanging on the wall

near the top of "exerciser." You will notice that the end of the strap is drawn through a buckle, which is fastened to another end of a strap, and also there is a common harness-snap attached to another part. Now, take this strap down (slip the handle out of the bottom cord you have been using) and attach the snap of the foot-strap to the loop of the cord. Unbuckle the end of the strap, and fasten it on to the heel. Be sure that when you fasten it the snap will be under the instep, and the strap will be buckled in front of the foot over the instep, like a stirrup.

Next face the "exerciser" with the body erect, hips drawn back, chest projected, shoulders drawn back, head erect, and chin drawn in. Stand far enough from "exerciser" so that, when the leg moves forward, the cross-piece will not strike above. Take a chair to steady you, holding it at the side. Now for the movement.

Carry the leg straight backward (holding the knee stiff and without allowing the body to move forward at the hips) and upward as far as possible without bending the body for-

ward, and then let it back to position again (see Fig. No. 49). Repeat this movement until you tire the muscle named; then change

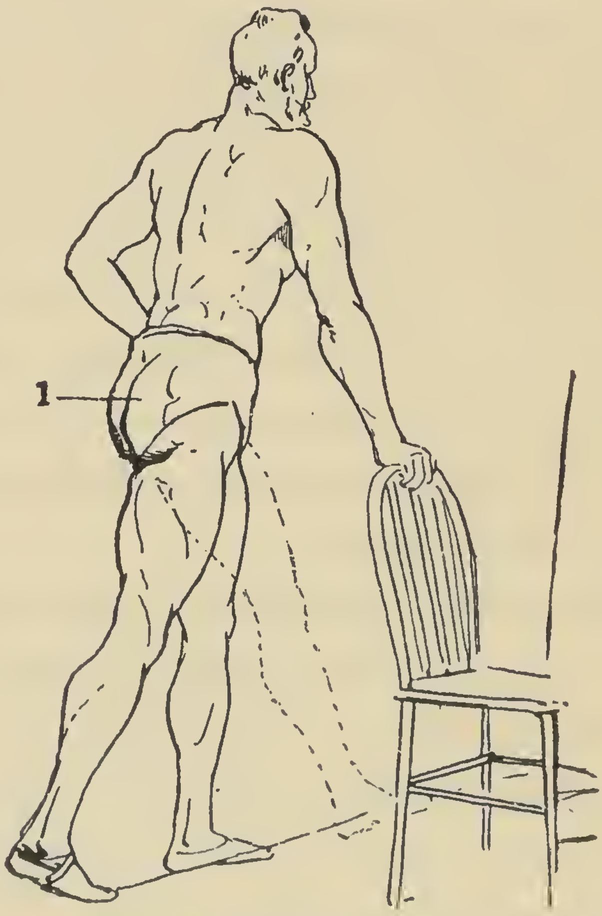


FIG. No. 49.—Gluteus Maximus. (See 1.)

to the other leg, and do the same. (The tendons of the gluteus maximus muscles, at their lower insertions, are attached to the sides of the femur (the bone of the upper leg) and at their origin are attached to the ileum

(the back and upper part of the hip-bone); and when these muscles are in contraction they carry the leg backward and upward, as well; keep the body in an erect position from the hips.

(The gluteus maximus muscles are the largest muscles of the body, and without their development to a considerable extent we cannot possibly have a very graceful figure.

(There are six or seven exercises with the foot-strap, and to save time it is best not to change the strap from the right foot to the left in every exercise, but to continue with it on the right foot until you have been through the half-dozen exercises, and then change it to the left.)

(SPECIFIC) EXERCISE NO. 29.—PSOAS MAGNUS AND ILIACUS, ON UPPER PART OF FRONT THIGH. (SEE I IN FIG. NO. 50.)

With back to the "exerciser," and strap on the foot as before, stand far enough away so that the cross-piece to which the foot-cord is attached will not strike at the top. Stand

with body erect, hips drawn back, chest projected, head erect, and chin drawn in. Now for the movement.

With the chair to balance you, carry the

FIG. No. 50.—Psoas Magnus and Iliacus; Gluteus Medius. (See I.)

leg (with the knee stiff) straight up high in front of the body; then lower and repeat the movement till you tire the muscles (see Fig. No. 50); then change to the other leg and do the same. (The psoas magnus and iliacus are not shown in Fig. No. 50, only the

gluteus medius, from the fact that they are not superficial muscles; they belong to the deeper layers, and are covered over by the outer layer, but as their especial work is to flex the leg on the pelvis we must give them a place in this system of exercises.

(The psoas magnus muscles, at their origins, are attached to the inner sides of the five lower vertebræ of the back-bone and pass along the side of the pelvis (hip-bone inside), and on down, till finally they are attached to the femur (bone of the upper leg); and the iliacus, at its origin, is attached to the crest of the ileum (upper sharp point of hip-bone) on the inner side, and passes downward, and is attached to the tendon of the psoas magnus; and when these two muscles are in contraction they carry the leg upward toward the abdomen.)

(SPECIFIC) EXERCISE NO. 30.—BICEPS OF LEG, MUSCLES ON BACK OF THIGH. (SEE 1 IN FIG. NO. 51.)

Stand facing "exerciser," body erect, hips drawn back, chest projected, head erect, and

chin drawn in. Stand far enough back from the "exerciser" that, when the foot moves forward, the cross-piece to which the foot-cord is attached will not strike at the top. Now,

FIG. NO. 51.—Biceps of Leg. (See 1.)

with the chair held in the right hand to balance you and the strap on the right foot, carry the lower leg backward and upward (bending at the knee) as high as possible without allowing the knee to pass forward

or back of the other one (see Fig. No. 51). Now lower to position again, and repeat this movement till the muscle is tired; then change to the left leg, and do the same as with the right. (The chair is to be held to brace to the best advantage. But if the right leg is being used you should use the right arm to brace with; if the left leg, the left arm, as the chair is to act as a substitute (for the leg that is being used) to brace up that side of the body.

(This biceps muscle of the back thigh is one of the ham-string muscles; but it has a special work of its own to perform, and therefore we give it special prominence. The tendons of the biceps muscle, at its origin or upper insertion, are attached to the lower and back part of the pelvis (bone of the hips), and at its lower insertion are attached to the fibula (bone back side of the lower leg); and when in contraction this biceps muscle flexes the lower leg on the back thigh.)

(SPECIFIC) EXERCISE NO. 31.—THE ADDUCTOR MUSCLES—ADDUCTOR BREVIS, ADDUCTOR LONGUS, AND ADDUCTOR MAGNUS, ON INSIDE OF THE THIGH. (SEE I IN FIG. NO. 52.)

With the right side turned toward the "exerciser" and the strap attached to the right foot, the feet together, body erect, hips drawn back, chest projected, head erect, and chin drawn in, holding the chair in front of the body this time, and standing far enough away from the "exerciser" that, when the foot moves toward it, the cross-piece to which the foot-cord is attached will not strike at the top. Now carry the leg from the side first toward the "exerciser," and then from there back and across in front of the left leg as far as you can, keeping the body and left leg straight (see Fig. No. 52). Repeat this movement till you tire the muscles on the inside of the thigh; then change to the left leg and work the same as with the right. (The tendons of the adductor muscles, at their origin or upper insertions, are attached to the under and lower

side of the pelvis (the bone of the hips), and at their lower insertions are attached along down the middle of the femur (bone of the

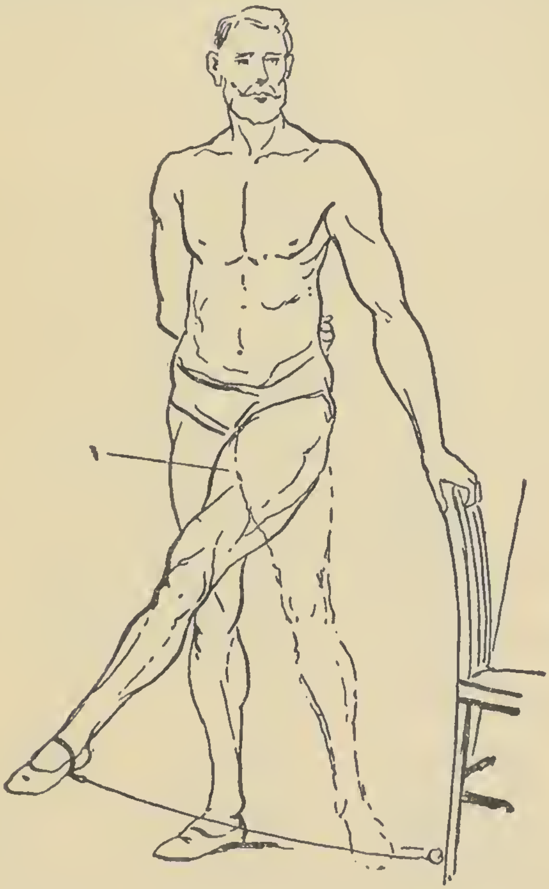


FIG. NO. 52.—Adductor Muscles. (See I.)

upper leg) ; and when in contraction they pull the thighs together.

These muscles are brought into play very strongly in horseback riding; especially in riding a vicious horse, when one has to press the flanks with the knees.

(SPECIFIC) EXERCISE NO. 32.—ABDUCTOR MUSCLES—GLUTEUS MEDIUS AND MINIMUS, MUSCLES ON THE OUTSIDE AND UPPER PART OF THE THIGH. (SEE 1 IN FIG. NO. 53.)

Stand with the left side to the "exerciser," with the strap on the right foot and holding the chair in front of the body; feet together, body erect, hips drawn back, chest projected, shoulders drawn back, head erect, and chin drawn in. Stand far enough from "exerciser" so that, when the foot moves toward it, the cross-piece will not strike at the top. This describes the position.

Now for the movement. Carry the right leg out sideways from the left as far as possible, keeping the body and left knee straight (see Fig. No. 53). Then carry the leg back across and in front of the left, toward the "exerciser" as far as you can conveniently. Perform this movement till you tire the muscles on the outside of right thigh near the joint, and then change to the left foot and do the same. (The gluteus medius and mini-

mus muscles, at their origin or upper insertions, are attached to the outer surface of the ileum—a point of the pelvis (bone of the hips), and at their lower insertions are attached to

FIG. No. 53.—Abductor Muscles. (See 1.)

the femur (bone of the upper leg) near the hip-joint; and when in contraction these muscles carry the leg outward and upward from the side.

(In performing these leg exercises you will

probably find that the leg which the body rests on will get tired much sooner than the one which you are using. This is quite natural, because it has to bear nearly the whole of the weight of the body, the chair serving only to steady and balance.

(The tiring of the muscles in this manner will not bring about any beneficial development; for, to secure this, we must contract and relax our muscles alternately, and in this case there is not enough of the standing on one leg to do any harm. If we were to continue standing on one leg for an hour or two at a time the result would be varicose veins.)

(SPECIFIC) EXERCISE NO. 33.—SARTORIUS OR TAILOR'S MUSCLE, ON THE INSIDE OF THE THIGH. (SEE 1 IN FIG. NO. 54.)

Keep the strap on the right foot; stand with the right side toward the " exerciser," but far enough away from it that the cross-piece, to which the foot-cord is attached, will not strike at the top. Stand with the feet together, body erect, hips drawn back, chest projected,

shoulders drawn back, head erect, and chin drawn in. Look now at Fig. No. 54, and see the position of the leg as it is drawn up. You see the foot has been drawn from a position

FIG. No. 54.—Sartorius. (See 1.)

far out sideways from the other leg, and up to it; the foot should pass upward still higher, until it gets above the knee, and then lower to its place; repeat the movement until the muscles are tired. Then change to the left leg,

and do the same as with the right. (This may seem a peculiar movement, but it is exactly what this muscle is put there for, and by performing it we can develop it to the best advantage. The sartorius muscle, at its origin or upper insertion, is attached to the ileum (bone of the hips), and at its lower insertion the tendon is attached to the tibia (bone on the front of the lower leg) near the knee-joint; and when in contraction they pull the lower leg upward and inward, bending at the knee, so that the heel will cross the thigh of the other leg just above the knee-joint. This sartorius is known as the tailor's muscle, because tailors use it to pull the legs into position when they sit down on their bench to work.)

(SPECIFIC) EXERCISE NO. 34.

For correcting what is commonly called pigeon-toed, generally caused from a weakness of the muscles along the side of the lower leg—the tibialis anticus, peroneus tertius, peroneus brevis and longus (see 1 in Fig. No. 55).

Now, with a single strap, with a buckle on one end so that you can fasten it around the foot as near the toes as possible, you can make the movement while sitting in a chair. Attach

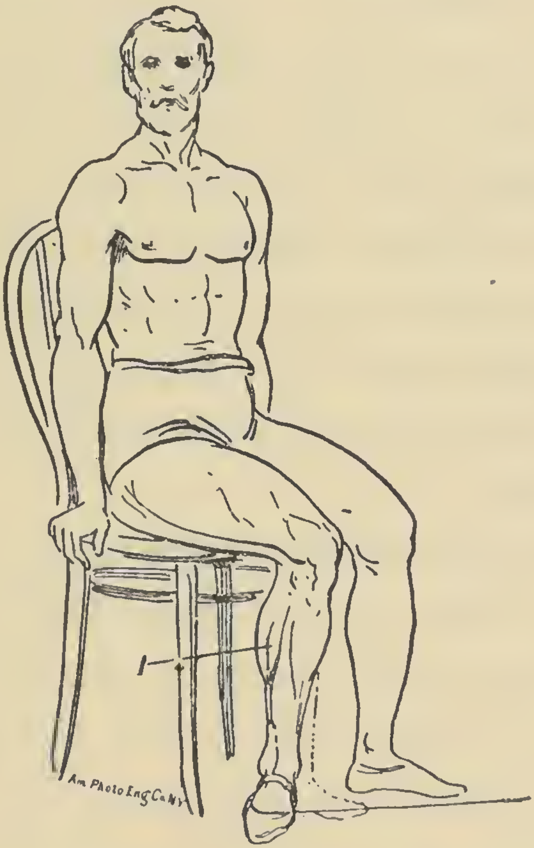


FIG. No. 55.—Peroneus Muscles. (See 1.)

the cord of the floor pulley to the foot-strap, on the right foot. Brace the inside of the heel of the right foot against the inside of the leg of the chair which is nearest the "exer-ciser;" then carry the toes to the right, away

from the "exerciser," keeping the heel braced against the leg of the chair. Repeat this movement until you have tired these muscles; and then change to the left foot, and do the same. (This movement can also be performed while standing, by bracing the heel against the other one. This is really an excellent exercise for turning the toes out to the right angle. People in the habit of toeing in, while walking, in many cases have the appearance of being bow-legged, when they are really not so, and would not look so if they would toe out instead of in.

(This very awkward habit can be easily got rid of by taking a little pains in walking and in practising the movement given here. The tendons of the muscles named in this exercise, at their upper insertions, are attached to the fibula near the knee-joint (bone at the back of the lower leg), and at their lower insertions are attached to different parts of the bones of the foot, and when in contraction they perform the action which has here been explained. The attachment of the tibialis anticus has been explained in specific exercise No. 27.)

These thirty-four exercises comprise the whole number of practical movements to be performed with the "exerciser," and they bring into contraction every muscle of the body, arms, and legs. Each set of muscles has a special movement; that is to say, no two exercises work the same set of muscles, but each set works independently of any other, and by the faithful performance of this system of exercises one can bring about the most perfect development of every muscle of the body, arms, legs, and neck, and all functions of the body that are connected directly with them; thus bringing about a healthy action of all the vital processes.

PLATE NO. V.—Muscles of the Front Figure.

PLATE V.—MUSCLES OF THE FRONT FIGURE.

A, Platisma Myoides, broad muscle of the neck; *a*, Sterno-hyoideus, muscle between the breast and tongue bones; *b*, Mastoideus, mastoid muscle; B, Deltoides, the muscle covering the shoulder-joint; C, Biceps Brachii, two-headed muscle of the arm; D, Pronator Radii Teres, pronating muscle of the arm; E, Supinator Radii Longus, supinating muscle of the arm; F, Flexor Carpi Radialis, radial flexor of the wrist; G, Palmaris Longus, long bending muscle of the hand; H, Flexor Carpi Ulnaris, ulnar flexor of the wrist; I, Pectoralis Major, large muscle of the chest; K, Obliquus Abdominis, oblique descending muscle; LL, Rectus Abdominis; *L*, Linea Semilunaris, semilunar line; M, Linea Alba, white line; N, Poupart's Ligament; OO, Sartorius, the "tailor's muscle;" P, Tensor Vaginæ Femoris, stretcher of the fascia lata; U, Psoas Magnus, large lumbar muscle. Quadriceps Extensor: V, Vastus Externus, great external muscle; W, Rectus Femoris, straight femoral muscle; X, Vastus Internus, great internal muscle. Y, Gastrocnemius, muscle of the calf of the leg; *y*, Soleus, a broad flat muscle of the leg; Z, Tibialis Anticus, anterior muscle of the leg.

PLATE NO. VI.—Muscles of the Side Figure.

Plate VI.—Muscles of the Side Figure.

A, Deltoides, muscles covering the shoulder-joint ; B, Biceps Brachii, two-headed muscle of the arm ; C, Brachialis Internus, internal muscle of the arm ; D, Supinator Radii Longus, long supinator of the radius ; E, Triceps, three-headed muscle ; F, Trapezius, trapezium-shaped muscle ; G, Latissimus Dorsi, lateral muscle of the back ; H, Serratus Major Anticus, large serrated anterior muscle ; I, Obliquus Abdominis, external oblique descending muscle ; K, Gluteus Maximus, largest thigh muscle ; L, Gluteus Medius, middle-sized thigh muscle. Quadriceps Extensor : M, Rectus Femoris, straight muscle of the thigh ; N, Vastus Internus, great internal muscle ; O, Vastus Externus, great external muscle. P, Tendons of the Semimembranosus and Semitendinosus Muscles, forming the inner ham-string ; Q, Tendon of the Biceps Femoris, forming the outer ham-string ; R, Iliacus Internus, internal iliac muscle ; S, Gastrocnemius Externus, external muscle of the calf ; T, Soleus, a broad, flat muscle of the leg ; U, Peroneus Tertius, fibular muscle of the leg ; V, Extensor Longus Digitorum Pedis, long extensor muscle of the toes ; W, Tibialis Anticus, anterior muscle of the leg.

Plate No. VII.—Muscles of the Back Figure.

PLATE VII.—MUSCLES OF THE BACK FIGURE.

A, Mastoideus, mastoid muscle ; B, Trapezius, trapezium-shaped muscle ; *a*, Infra Spinatus, the muscle beneath the spine of the scapula ; *b*, Teres Minor, long round smaller muscle ; *c*, Teres Major, long round larger muscle ; C, Latissimus Dorsi, lateral muscle of the back ; D, Deltoides, muscle covering the shoulder-joint ; *f*, Triceps Brachialis, three-headed muscle of the arm ; *g*, Anconeus, muscle of the elbow ; *h*, Extensor Carpi Radialis Longus, long radial extensor of the wrist ; E, Sacro Lumbalis, muscle of the sacrum and loins ; F, Longissimus Dorsi, long muscle of the back ; G, Gluteus Medius, middle-sized muscle of the thigh ; H, Gluteus Maximus, largest muscle of the thigh ; I, Semitendinosus, half-tendinous muscle ; K, Semimembranosus, half-membranous muscle ; L, Biceps Femoris, two-headed thigh muscle ; M, Gastrocnemius Externus, external muscle of the calf.

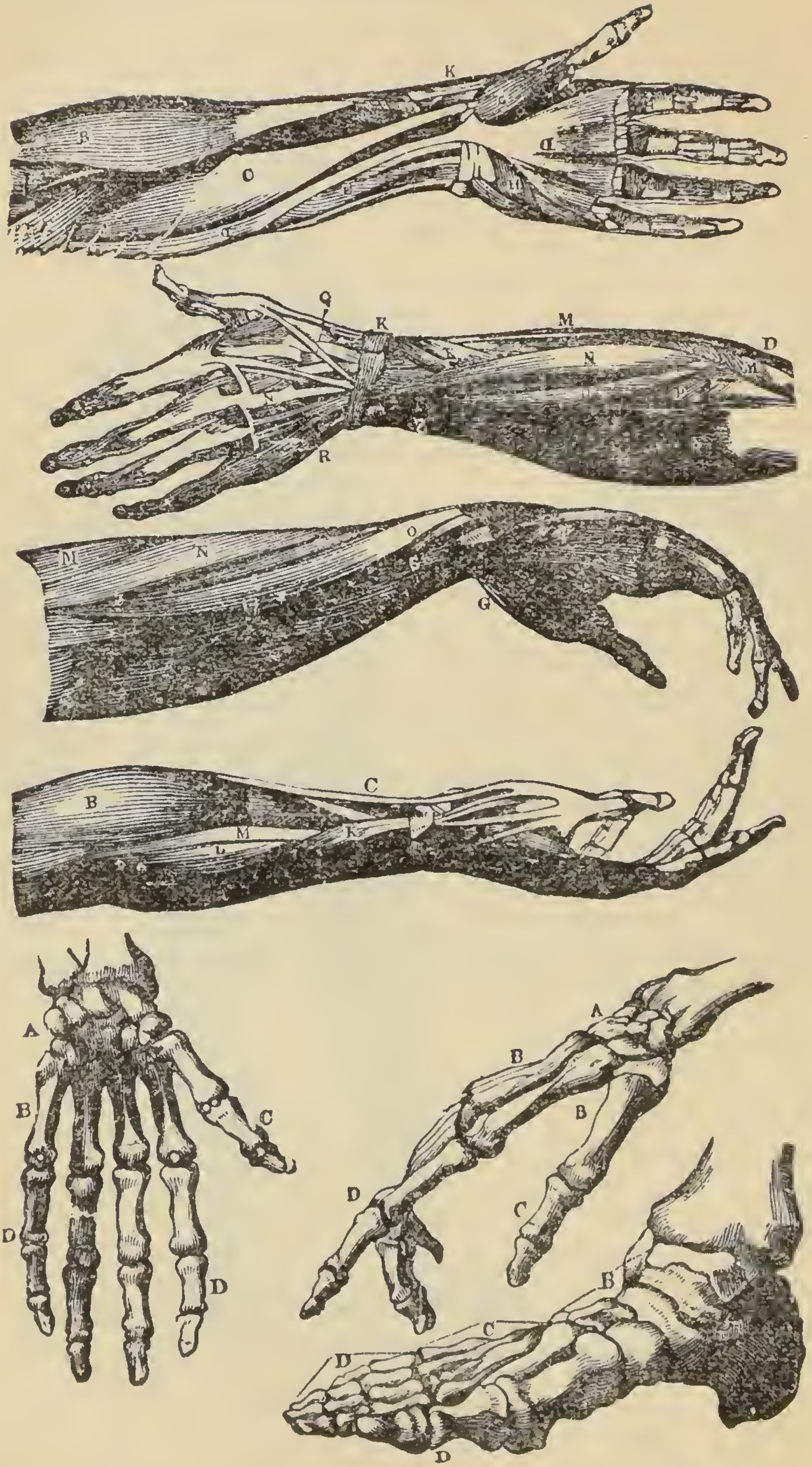


PLATE NO. VIII.—Muscles of the Forearm and Bones of the Hand and Foot.

Plate VIII.—Muscles of the Forearm and Hand.

A, Pronator Teres, long round pronator muscle ; B, Supinator Radii Longus, long radial supinator ; C, Flexor Carpi Radialis, radial flexor of the wrist ; D, Palmaris Longus, long muscle of the palm ; E, Perforatus and Perforans, perforated and perforating muscles ; G, Abductor Pollicis Manus, abductor of the thumb ; H, Palmaris Brevis, short muscle of the palm ; k, Extensor Pollicis, extending muscle of the thumb ; K, Extensor Primi Internodii, extensor of the first finger ; L, Extensor Carpi Radialis Brevis, short radial extensor of the wrist ; M, Extensor Carpi Radialis Longus, long radial extensor of the wrist ; N, Extensor Digitorum, extensor of the fingers ; O, Extensor Carpi Ulnaris, ulnar extensor of the wrist ; P, Anconeus, muscle of the elbow ; Q, Extensor Secundi Internodii, supinator and extensor of the thumb ; R, Extensor Minimi Digiti, extensor of the little finger ; S, Flexor Carpi Ulnaris, ulnar flexor of the wrist.

Bones of the Hand.

A, Carpus, bones of the wrist ; B, Metacarpus, bones of the hand ; C, Digitus Primus, bones of the thumb ; D, Phalanges, bones of the fingers.

Bones of the Foot.

A, Os Calcis, heel-bone ; B, Tarsus, bones of the instep ; C, Metatarsus, bones of the foot ; D, Phalanges, bones of the toes.

CHAPTER XII.

DUMB-BELL EXERCISES.

A GREAT deal of benefit, physically, can be derived from the use of dumb-bells, but in order to gain it you must understand how to use them in an intelligent and scientific manner. Many people have resorted to the use of dumb-bells to better their physical condition; they have bought a pair of bells of a weight ranging from ten to a hundred pounds, and set to work with them without any special direction as to how they should be used to the best advantage. Indeed, I think the great majority of those that have indulged in the use of them have done themselves more harm than good, more especially those who have used heavy weights, and the rest have become tired because they did not know how to use them, thus losing their interest in the work. The performer should have understood that there is a special exercise for every set

of muscles in the body, and just how to apply it.

In the following pages you will find special exercises for some of the prominent muscles of the body, arms, and legs. Many of them can be developed by the intelligent use of dumb-bells. But we cannot hope by their means to develop the chest and lungs so well as with an apparatus like the "exerciser," which is described in Plate No. III. With such an apparatus you do not need dumb-bells nor any other apparatus; for, by following the instructions for its use, you can develop all parts of the body to perfection.

One great drawback to the use of dumb-bells is the monotony of the work; but if you will, you can do yourself considerable good by their use.

In using bells remember the following hints:

First: You must practise at least five times a week, but if you can practise once every twenty-four hours so much the better; the whole exercise will not last over forty-five minutes.

Second: You must work every muscle un-

til you have tired it, and make it ache a little. From this light exercise the muscles will recover their strength very quickly. Always stand erect, with the head up and the chest projected.

For business people about 4 P.M. is generally thought the best time to exercise, for it is this time that the general depression from business is most keenly felt; hence the reason for livening up before the evening meal by a little exercise. If you cannot take this hour, then almost any time of day or evening will do.

Third: When performing with the dumb-bells, be sure not to swing the arms, I mean that swing that is given to them by a motion of the body, but raise and lower them by the power of the muscles, and not the swing.

Fourth: Make all the movements fairly quick and even; do not make any jerky movements. Bear in mind that you must not tire the muscles to the fullest extent until you have practised for about two weeks.

Fifth: From five to eight pounds for each bell should be used. The strongest should not use more than eight pounds. Ladies

should use from three to five pounds according to the strength.

Sixth: You must practise the exercises in the order in which they are here given, as they have been arranged to the best advantage.

DUMB-BELL EXERCISE NO. 1.—LATERAL PORTION OF THE DELTOID MUSCLE, ON THE SIDE OF THE SHOULDER. (SEE 1 IN FIG. NO. 56.)

Take a bell in each hand, with the palms turned toward the outside of the thigh, and maintaining the body erect, the feet together, the hips drawn back, the chest projected, the shoulders drawn back, the head erect, and the chin drawn in (see Fig. No. 14). Now, with the arms straight and stiff, raise them up both together (only one raised in figure) straight out and up from the sides of the body, and as high as you can (see Fig. No. 56). Repeat this movement until you tire the shoulder-muscles. Inhale strongly and deeply as the arms are ascending, and exhale forcibly as the arms are descending.

Take breath this way ten or a dozen times, and then fill the lungs comfortably full and hold the breath in while you make three or four movements, or as many as you can con-

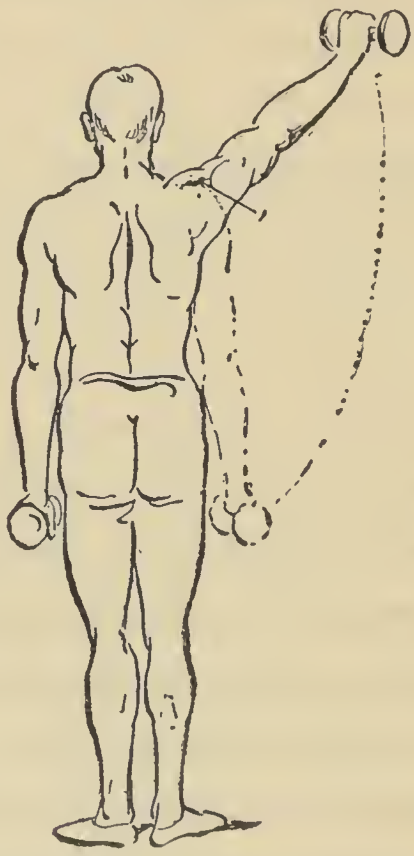


FIG. NO. 56.—Lateral Deltoid. (See 1.)

veniently; then let it out, and repeat it until you feel that you have tired the lungs slightly. (The tendon of this portion of the deltoid muscle, at its lower insertion, is connected with anterior and posterior portions of the

deltoid, and is attached to the humerus (bone of the upper arm) a few inches below the shoulder-joint, and at its upper insertion is attached to the scapula (bone of the shoulder); and when in contraction it moves the arm outward and upward from the side of the body, as shown in Fig. No. 56.

(There are three portions of the deltoid muscle, and we have a separate exercise for each; of course, performing any one of these three movements would, to some extent, bring into contraction the other two portions, for they all three aid each other in their special work; but we can bring them to a more symmetrical development by exercising each part separately, than is possible with one exercise for the three.)

DUMB-BELL-EXERCISE NO. 2.—LATISSIMUS DORSI, MUSCLE COVERING THE SIDE OF THE BACK. (SEE I IN FIG. NO. 57.)

With a bell in each hand, stand with the body erect, the feet together, hips drawn back, the chest projected, the shoulders drawn

back, the head erect, and the chin drawn in (see Fig. No. 14). Now, keeping the body as stiff as is possible, press the left arm downward as hard as you can, by drooping the

FIG. NO. 57.—Latissimus Dorsi. (See 1.)

shoulder, just as though you were pushing against some object on the floor that reached to your hand (see Fig. No. 57), then allow the arm and shoulder to assume their natural position again, and perform the same with the

right arm; use the right and left alternately in this exercise until you tire the muscle named. (You may not at first get much satisfaction from this exercise, unless you happen to get it just right; but satisfaction will soon come, if you will persevere in the effort.

(The latissimus dorsi is a large, broad, flat muscle covering a portion of the side of the back (see 1 in Fig. No. 57). At its upper insertion it is attached to the humerus (bone of the upper arm), and along the side of the back to the lower ribs; at its lower insertion it is attached to the crest of the ileum (back portion of the hip-bone). When the latissimus dorsi is in contraction it moves the arm from an upward position downward and backward; also when the arm is hanging at the side it depresses the shoulder by forcing the arm downward and outward, as is represented in Fig. No. 57.)

DUMB-BELL EXERCISE NO. 3.—ANTERIOR PORTION OF THE DELTOID MUSCLE ON THE FRONT OF THE SHOULDER. (SEE I IN FIG. NO. 58.)

Take a bell in each hand, with the palms turned to the front; stand with the body erect, feet together, hips drawn back, chest projected, shoulders drawn back, head erect, and chin drawn in (see Fig. No. 14). Now, with the arms straight and stiff, raise them up both together, straight out and up in front of the body as high as you can (see Fig. No. 58). Repeat this movement until you tire that portion of the deltoid mentioned. Inhale strongly and deeply as the arms are ascending, and exhale strongly as the arms are descending. Take the breath in this way ten or a dozen times, and then fill the lungs comfortably full, and hold the breath in while you make three or four movements, or as many as you can conveniently. Then let it out, and repeat the same until you feel that you have tired the lungs slightly.

The tendon of this portion of the deltoid

muscle, at its lower insertion, is connected with the lateral and posterior portions of the deltoid, and is attached to the humerus (bone of the upper arm) a few inches below the

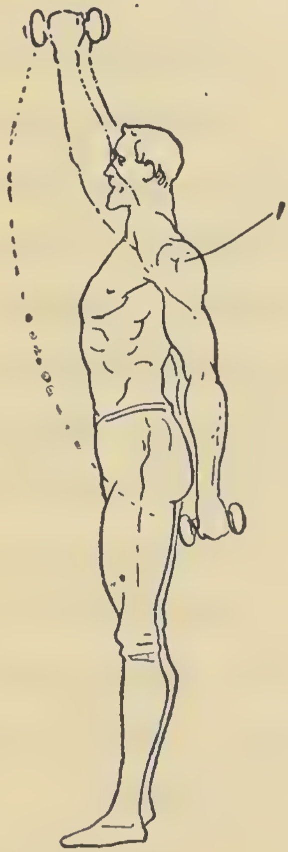


FIG. NO. 58.—Anterior Deltoid. (See 1.)

shoulder-joint, and at its upper insertion is attached to the clavicle (collar-bone); and when in contraction it moves the arm outward and straight upward from the front of the body, as is represented in Fig. No. 58.

DUMB-BELL EXERCISE NO. 4.—MUSCLES OF THE FOREARM. (SEE 1 AND 2 IN FIG. NO. 59.)

Take a bell in each hand, with the palms turned toward the outside of the thigh, with the body erect, feet together, hips drawn back, chest projected, shoulders drawn back, head erect, chin drawn in; now contract the inner portion of the forearm muscles, by bending the hand at the wrist inward and upward (see Fig. No. 59), then bend the hand at the wrist backward and upward. Repeat this movement with the hands at the same time; first turn them inward as strongly as you can, and then turn them backward as strongly as possible until you make the muscles of the forearm ache.

There are about eighteen different muscles in the forearm, most of which are brought into contraction by this movement of the hand. Some of the forearm muscles, at their upper insertions, are attached to the humerus (bone of the upper arm), but the greater number of them are attached to the ulna and radius (the

two bones of the forearm) near the elbow-joint. At their lower insertions the tendons of some of them are attached to the bones of the hand and the wrist, and others to the

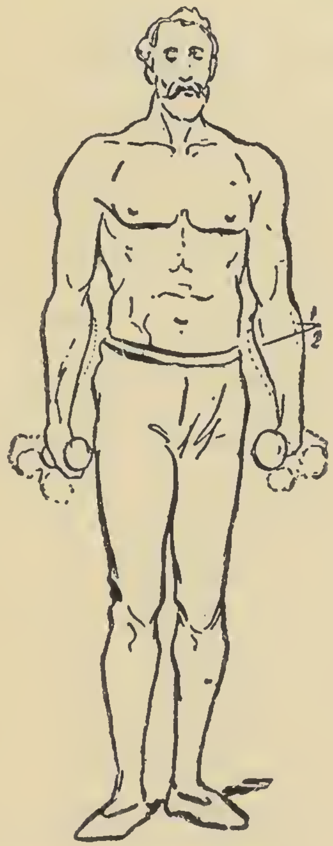


FIG. No. 59.—Forearm Muscles. (See 1 and 2.)

bones of the fingers, and when in contraction they move the hand, bending at the wrist at all the various angles. They also open and shut the fingers, which is a splendid exercise for strengthening the grip of the hand and developing the muscles of the forearm.

DUMB-BELL EXERCISE NO. 5.—MUSCLES ON THE SIDES OF THE ABDOMEN, OBLIQUUS ABDOMINIS. (SEE I IN FIG. NO. 60.)

Take a ball in each hand, arms hanging down at the sides. Stand erect, feet together, hips drawn back, chest projected, shoulders drawn back, head erect, chin drawn in. Now bend the body sideways, and a little forward; bending only at the hips sideways as far as possible, then rise, and bend over the other side in the same manner (see Fig. No. 60).

Take the breath in as the body is going from the right side to the left, and exhale as it is going to the right. Do so a few times, and then reverse the action of taking in the breath; after breathing this way a few times, take in quite a full breath, and hold it while you make as many movements as you can conveniently without feeling any strain. Then exhale, and repeat the exercise until you have tired the muscles. Should the lungs get tired before the muscles do, then stop the special breathing and continue the movement.

The obliquus abdominis muscles cover the sides of the abdomen. They are attached to the eight lower ribs from above, and their

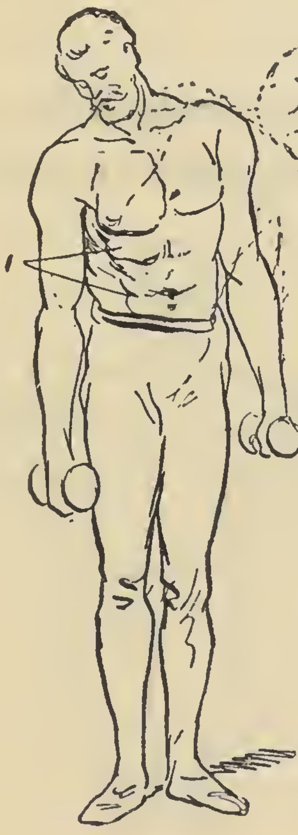


FIG. No. 60.—Obliquus Abdominis. (See 1.)

lower attachment is to the crest of the ileum (forward and upper part of pelvic or hip-bone); and when in contraction they move the body from side to side, bending at the hips, and also act as balancing muscles for the trunk.

DUMB-BELL EXERCISE NO. 6.—MUSCLES ON THE FRONT OF THE UPPER ARM, BICEPS. (SEE 1 IN FIG. NO. 61.)

With a bell in each hand, arms hanging down straight and palms turned to the front,

FIG. No. 61.—Biceps. (See 1.)

stand with the body erect, feet together, hips drawn back, chest projected, shoulders drawn back, head erect, and chin drawn in. Now,

keeping the elbows firmly at the sides, raise the bells to the shoulders by bending the arms at the elbows (see Fig. No. 61). Lower the bells to the sides again, and repeat the movement until you make the muscles ache; be sure and give them the full contraction, by allowing the arms to straighten fully, and then to move upward to the highest point possible each time. The biceps muscles, at their upper insertions, are attached to that part of the scapula (bone of the shoulder, or shoulder-blade) which forms the upper portion of the shoulder-joint, and at their lower insertion are attached to the radius (small bone of the forearm) about an inch and a half below the elbow-joint in front, and when in contraction move the forearm as the arm bends at the elbow-joint.

DUMB-BELL EXERCISE NO. 7.—LOINS OF THE BACK, ERECTOR SPINÆ (SEE 1 IN FIG. NO. 62) AND HAM-STRING MUSCLES.

With a bell in each hand, body erect, feet together, hips drawn back, chest projected, shoulders drawn back, head erect, and chin

drawn in. Now, keeping the knees stiff, incline forward and downward (bending only at the hips), letting the bells come as near the floor as possible. Then, with the arms rigid

FIG. No. 62.—Erector Spinæ. (See 1.)

and straightened out at full length in front of you, raise the body upward and bend a little backward (see Fig. No. 62). The arms should be held rigidly extended in front of the body all the time you are performing this

movement; inhale deeply as the body moves forward and downward, and exhale forcibly as the body is moving upward and backward.

This movement is very excellent for strengthening a weak back. These erector spinæ muscles are attached along the vertebræ, also to the ribs and the back point of the pelvis (hip-bone); when in contraction they hold the spine erect, and also move it from a forward bent to a backward bent position, as is represented in Fig. No. 62.

DUMB-BELL EXERCISE NO. 8.—MUSCLES ON THE BACK OF THE UPPER ARM, LATERAL AND POSTERIOR PORTIONS OF THE TRICEPS MUSCLES. (SEE 1 AND 2 IN FIG. NO. 63.)

With a bell in each hand, raise the hands to the shoulders by bending the arms at the elbows. Stand with the feet together, body erect, hips drawn back, chest projected forward, shoulders drawn back, head erect, chin drawn in. Now elevate the bell in right hand straight above the head, extending the arm at

full length (see Fig. No. 63); then draw the right arm back to the shoulder again, and while doing so extend the bell in left hand, straight above the head, thus exercising the

FIG. No. 63.—Triceps Muscles. (See 1 and 2.)

left and right arm alternately. Continue this exercise until you have tired the muscles named. This movement brings into contraction both the lateral and posterior portion of the triceps at the same time, and also brings

into contraction the deltoid muscles, to some extent.

The tendons of the triceps muscles, at their lower insertions, are attached to the ulna, large bone of the forearm that forms the elbow-joint, a little below it, and at their origin or upper insertions are attached to the humerus (bone of the upper arm) ; when in contraction they straighten the arm at the elbow-joint.

DUMB-BELL EXERCISE NO. 9.—MUSCLES OF THE BREAST, PECTORALIS MAJOR. (SEE I IN FIG. NO. 64.)

Bell in each hand, body erect, feet together, hips drawn back, chest projected, shoulders drawn back, head erect, and chin drawn in.

Now, keeping the arms very rigid, move them across the body in front as far as you can, meanwhile keeping the elbows stiff and straight ; see that the arms are kept close to the body, and allow them to cross each other (see Fig. No. 64) ; then move them back to place, and repeat the movement until you have

tired the muscles named (the faithful practice of this exercise will bring about a very rapid and beneficial development).

Inhale the breath as the muscles are relax-

FIG. No. 64.—Pectoralis Major. (See I.)

ing and the arms are moving from the front of the body to the sides, and exhale strongly as the arms are moving from the sides forward and across the body.

(The pectoralis major is a broad, thick, tri-

angular muscle situated at the upper and fore part of the chest; it rises from the anterior surface of the clavicle (collar-bone) from half the breadth of the anterior surface of the sternum (breast-bone) as low down as the sixth or seventh rib. The fibres of this muscle all terminate in a flat tendon about two inches broad, which is inserted into the anterior edge of the humerus (bone of the upper arm); when in contraction this muscle moves the arm across the front of the chest, if the elbow is kept stiff.)

DUMB-BELL EXERCISE NO. 10.—MIDDLE PORTION OF THE TRAPEZIUS MUSCLES OF THE BACK. (SEE I IN FIG. NO. 65.)

Bell in each hand, the arms straight at the sides of the body, body erect, feet together, hips drawn back, chest projected, shoulders drawn back, head erect, and chin drawn in (see Fig. No. 14). Now for the movement. Make an effort to raise the shoulders upward (keeping the arms perfectly straight; see Fig. 65) as high as you can, making a movement

called shrugging of the shoulders. Repeat this movement rapidly until you have tired the muscles named, which will not take many

FIG. No. 65.—Middle Trapezius. (See 1.)

seconds if you contract the muscles fully each time.

The attachments of this portion of the trapezius muscles are to the upper part of the spine, and also to the clavicle (collar-bone) at the point attached to the upper part of the shoulder; when in contraction they pull the

shoulders upward, and slightly approaching the sides of the neck.

It is very essential that this portion of the trapezius should be exercised, if you wish to have the upper portion of the shoulder and lower portion of the neck strong and plump, for the two are blended together at this point.

DUMB-BELL EXERCISE NO. 11.—POSTERIOR PORTION OF THE TRICEPS MUSCLES. (SEE 1 IN FIG. NO. 66.)

Bell in hand, body erect, feet together, hips drawn back, chest projected, shoulders drawn back, head erect, and chin drawn in. Hold the arms straight at the sides, with the palms turned to the front; now raise the arms (both together) backward as high as possible, and at the same time twist them *outward* as much as possible. This twisting is the most important part of this movement, so you must be sure and get it right. Twist the arms outward and backward as hard as you can, so that the backs of the hands will approach

each other (see Fig. No. 66). Inhale deeply as the arms are moving backward, and exhale strongly as the arms are coming forward again; repeat until you tire the mus-

FIG. No. 66.—Posterior Triceps. (See 1.)

cles. (The tendons of this portion of the triceps muscle, at its lower insertion, are attached to the ulna (bone of the forearm) at the elbow-joint, and at their upper insertion to the scapula (shoulder-blade), unlike the lat-

eral portion, which is attached to the humerus (bone of upper arm) near the shoulder-joint. This posterior portion is attached to the scapula, and when in contraction gives to the arm that peculiar rotary motion which you must strive to get in this exercise, if you would improve the development of this portion of the arm.)

DUMB-BELL EXERCISE NO. 12.—POSTERIOR PORTION OF THE DELTOID MUSCLES ON THE BACK OF THE SHOULDER. (SEE I IN FIG. NO. 67.)

Bell in each hand, body erect, feet together, hips drawn back, chest projected, shoulders drawn back, head erect, and chin drawn in.

Turn the palm of the hand in toward the outside of the thigh, pitch the body a little forward, bending at the hips (so that your arm may rise higher); now move the right arm straight backward and upward, as high as you can without twisting the arm in any way (see Fig. No. 67); then lower to its

place and do the same with the left arm, and make the movement with the right and left arm alternately, until you tire the muscle. (The tendons of this portion of the deltoid

FIG. No. 67.—Posterior Deltoid. (See 1.)

muscles, at their upper insertions, are attached to the back and upper part of the scapula (bone of the shoulder), and at their lower insertion to the humerus (bone of upper arm) a few inches below the shoulder-joint; and

when in contraction it moves the arm straight backward and upward.)

DUMB-BELL EXERCISE NO. 13.—MUSCLES ON FRONT OF THE THIGHS, QUADRICEPS EXTENSOR. (SEE I IN FIG. NO. 68.)

Bell in each hand, body erect, feet together,

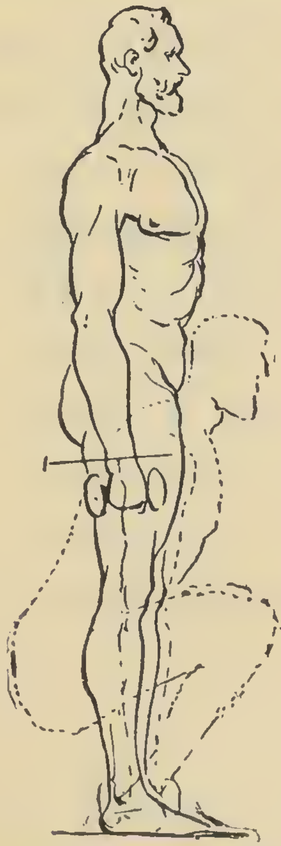


FIG. No. 68.—Quadriceps Extensor. (See 1.)

hips drawn back, chest projected, shoulders drawn back, head erect, and chin drawn in;

now drop the body as near the floor as you can, bending at the hips and knees (see Fig. No. 68); then rise and repeat the movement, until you tire the muscles of the thighs.

Inhale as the body is lowering, and exhale strongly as the body is rising. This movement is what one could correctly term squatting.

There are four heads or origins to the quadriceps extensor; some of their tendons are attached to the femur (bone of the upper leg) near the hip-joint, and others to the pelvis (bone of the hips). At its lower insertion this quadriceps muscle converges into one large tendon, and is attached to the tibia (shin-bone) just below the knee-joint; it is also attached to the patella (knee-cap), and when in contraction it straightens the knees.

DUMB-BELL EXERCISE NO. 14—MUSCLES OF THE CALF, GASTROCNEMIUS AND SOLEUS. (SEE I IN FIG. NO. 69.)

Bell in each hand, body erect, feet together, hips drawn back, chest projected, shoulders

drawn back, head erect, and chin drawn in. Hold this position and rise as high as possible on your toes (see Fig. No. 69). Repeat this movement until you have tired the mus-

FIG. No. 69.—Gastrocnemius and Soleus. (See 1.)

cles. Bear in mind that you must rise as high as possible each time, if you would gain the best results. The tendons of the calf-muscles, at their upper insertions, are attached to the femur (bone of the upper leg), and at their

lower insertions they converge to and form the tendon Achillis.

This tendon is attached to the os calcis (bone of the heel), and when in contraction they raise the heels from the floor, thus precipitating the whole body forward and upward on the ball of the foot, or the toes. When you are walking, if you will take pains to rise well on the toes at each step, you will aid very materially in developing these muscles.

DUMB-BELL EXERCISE NO. 15.—MUSCLES ON THE BACK OF THE THIGHS, BICEPS. (SEE I IN FIG. NO. 70.)

No bells this time, if you are tired of holding them; if not, hold them to steady yourself with.

Body erect, hips drawn back, chest projected, shoulders drawn back, head erect, and chin drawn in (see Fig. No. 14). Now raise the left leg upward from behind (bending at the knee) as high as you can; but do not let the left knee swing forward from the right, but hold it firmly against it (see Fig. No. 70).

Lower to place again, and repeat the movement until you tire the muscle; then change to the right leg and tire that one. Be sure and rise as high as possible each time, and

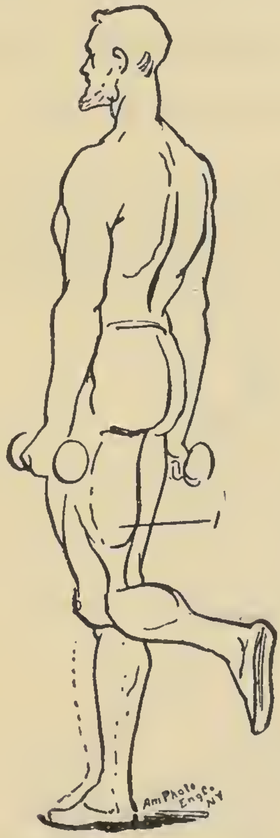


FIG. No. 70.—Biceps of Leg. (See 1.)

lower full length. (The tendons of the biceps muscle, at its origin or upper insertion, are attached to the lower and back part of the pelvis (bone of the hips), and at its lower insertion are attached to the fibula (bone of

the back of the lower leg); and when in contraction the biceps flexes the lower leg on the back of the thigh.)

DUMB-BELL EXERCISE NO. 16.—MUSCLES ON FRONT OF LOWER LEG, TIBIALIS ANTICUS. (SEE I IN FIG. NO. 71.)

No bells. Sit in a chair or on a bench, and stretch your legs nearly at full length in front

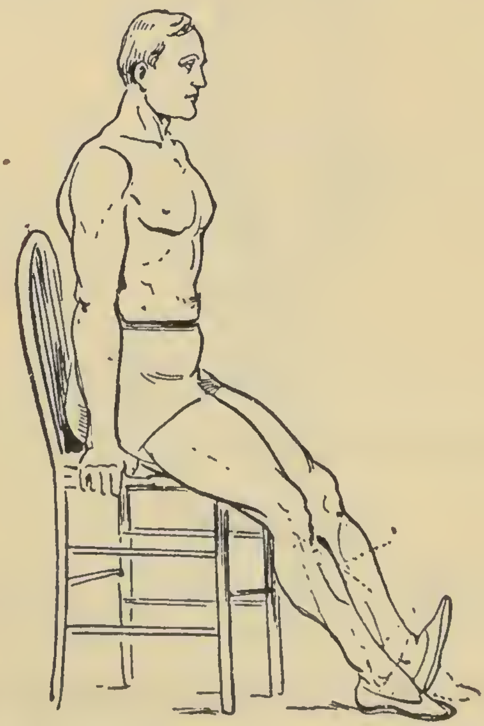


FIG. NO. 71.—Tibialis Anticus. (See I.)

of you, with the heels pressed firmly on the floor; now move the toes toward the body as hard as you can, bending the foot at the ankle

joint (see Fig. No. 71); then press them back again firmly, both feet together, and give the muscles the full contraction each time. Repeat the movement until you have tired the muscles mentioned. (The tibialis anticus, at its origin, is attached to the tibia (bone of the front of lower leg) near the knee-joint at the outside, and the tendon, at its lower insertion, is attached to the cuneiform and metatarsal (bones forming the first joint of the great toe); and when in contraction it flexes the foot on the lower leg in front. This is a muscle much used in rowing, if one is using a sliding seat; it also raises the toes in walking, so that we will not drag them along the ground.)

DUMB-BELL EXERCISE NO. 17.—MUSCLES ON FRONT OF THE ABDOMEN, RECTUS ABDOMINIS. (SEE I IN FIG. NO. 72.)

Lie out at full length on a sofa, a bench, or on the floor; place your arms at the side or across your breast, as you choose; now raise the body from the prone to a sitting position (see Fig. No. 72); then lower it again. Re-

peat this movement until you feel that you have tired the muscles of the abdomen.

If this should prove to be too severe an exercise for you, then only lower the body part way down, until you gain more strength. If your legs seem to rise when you attempt to raise the body, then put some weight on them

FIG. NO. 72.—Rectus Abdominis. (See 1.)

to keep them down. The tendons of the rectus abdominis, at their upper insertions, are attached to the lower point of the sternum (breast-bone), and at their lower insertions are attached to the central portion of the pelvis (bone of the hips) in front; and when in contraction they move the body forward, bending at the hips. The strengthening of these muscles is one of the greatest safe-

guards against hernia, of which so many are victims.

On the following pages are shown some of the results derived from the faithful practice of the system of exercises set forth in this volume, as performed with the "Home Exerciser."

APPENDIX A.

A few instances showing the results of training under the author's system as applied to the "Home Exerciser" are now given. The first column gives the measurement of pupils when admitted; the second shows the increase after practice for the time stated.

Rockwood Hoar, son of Senator Hoar, of Worcester, Mass., aged twenty-nine; the following changes in five months and two days' practice, from November 28, 1882, to May 1, 1883.

Weight, 158 pounds	165 pounds.
Height, 5 feet 8½ inches	5 feet 9 inches.
Chest circumference, 38 inches	39½ inches.
Neck, 14 inches	14½ "
Forearm, 10¾ inches	11 "
Biceps straight, 11¾ inches	12¾ "
Biceps flexed, 13⅓ inches	14⅛ "
Shoulder, 18¾ inches	19 "
Waist, 29⅜ inches	30 "
Thigh, 20½ inches	21 "
Calf, 14½ inches	15 "
Chest expansion, 4¾ inches	6 "

APPENDIX B.

W. W. Hobbs, aged eighteen, of Worcester, Mass.; two months' practice.

Weight, 146 pounds	158 pounds.
Neck circumference, 13¾ inches	14½ inches.

Chest, 35 inches	38	inches.
Forearm, $9\frac{3}{4}$ inches	11	"
Biceps straight, $10\frac{1}{8}$ inches	$11\frac{1}{2}$	"
Biceps flexed, 11 inches	$12\frac{1}{2}$	"
Shoulder, $16\frac{3}{4}$ inches	19	"
Waist, 28 inches	$29\frac{3}{4}$	"
Thigh, $19\frac{1}{2}$ inches	21	"
Calf, $13\frac{3}{4}$ inches	$14\frac{3}{4}$	"
Chest expansion, $3\frac{3}{4}$ inches	$5\frac{1}{2}$	"

APPENDIX C.

John Nelson, aged seventeen, son of Judge Nelson, Worcester, Mass.; five months' practice, from November 27, 1882, to May 27, 1883.

Height, 5 feet $7\frac{7}{8}$ inches	5 feet 8	inches.
Weight, 127 pounds	143	pounds.
Neck circumference, $14\frac{1}{2}$ inches	$14\frac{3}{4}$	inches.
Chest, $34\frac{3}{4}$ inches	$36\frac{1}{2}$	"
Forearm, $9\frac{5}{8}$ inches	$10\frac{1}{2}$	"
Biceps straight, 10 inches	$10\frac{3}{4}$	"
Biceps flexed, $11\frac{1}{8}$ inches	$12\frac{3}{4}$	"
Shoulder, $16\frac{1}{2}$ inches	$17\frac{5}{8}$	"
Waist, $27\frac{3}{4}$ inches	29	"
Thigh, $18\frac{3}{4}$ inches	$20\frac{1}{2}$	"
Calf, $13\frac{1}{4}$ inches	$14\frac{1}{2}$	"
Chest expansion, $2\frac{3}{4}$ inches	$4\frac{3}{4}$	"

APPENDIX D.

W. C. White, aged sixteen, son of Dr. White, of Springfield; three years' practice, from October 15, 1879, to October 1, 1882.

Weight, 134 pounds.................178 pounds.
Height, 5 feet 6 inches...............5 feet 10 inches.
Neck circumference, 13 inches......14½ inches.
Chest, 34 inches.....................40 "
Forearm, 10½ inches.................11¾ "
Biceps straight, 10¾ inches..........12½ "
Biceps flexed, 12½ inches............14½ "
Shoulder, 17 inches..................19 "
Waist, 30 inches.....................31 "
Thigh, 21 inches.....................23 "
Calf, 13 inches......................15 "
Chest expansion, 2½ inches...........5½ "

APPENDIX E.

E. Wilder, aged forty, Springfield, Mass.; six months' practice in warm weather, from July 6, 1882, to January 1, 1883.

Weight, 148 pounds.................165 pounds.
Height, 5 feet 7½ inches...............5 feet 7½ inches
Neck circumference, 14 inches......15¼ inches.
Chest, 36 inches.....................38 "
Forearm, 11 inches.................11½ "
Biceps straight, 11½ inches..........12 "
Biceps flexed, 13 inches............14 "
Shoulder, 18 inches..................18¾ "
Waist, 31 inches.....................31 "

Thigh, 20 inches ....21 inches.
Calf, $14\frac{1}{2}$ inches ....$15\frac{1}{4}$ "
Chest expansion, 3 inches ....$5\frac{1}{2}$ "

APPENDIX F.

James M. Thompson, aged nine, son of Colonel James M. Thompson, of Springfield, Mass.; six months' practice, from March to June, 1883, and from November 14, 1883, to February, 1884.

Weight, 78 pounds ....85 pounds.
Height, 4 feet $6\frac{1}{2}$ inches..............4 feet $8\frac{3}{4}$ inches.
Neck circumference, 11 inches.....$11\frac{1}{2}$ inches.
Chest $26\frac{1}{2}$ inches..................28 "
Forearm, $7\frac{3}{4}$ inches..................$8\frac{1}{4}$ "
Biceps straight, 8 inches..............$8\frac{1}{2}$ "
Biceps flexed, $8\frac{1}{2}$ inches..............$9\frac{1}{4}$ "
Shoulder, 12 inches..................$13\frac{1}{4}$ "
Waist, $23\frac{1}{2}$ inches....................$24\frac{1}{2}$ "
Thigh, $15\frac{3}{4}$ inches...................17 "
Calf, $11\frac{1}{8}$ inches......................$11\frac{1}{2}$ "
Chest expansion, $2\frac{1}{4}$ inches...........3 "

APPENDIX G.

S. W. Bowles, aged seventeen, son of Dr. S. W. Bowles, of Springfield, Mass.; fifteen months' exercise, from January 1, 1882, to April 1, 1883.

Weight, 127 pounds...............157 pounds.
Height, 5 feet $8\frac{1}{4}$ inches.............5 feet 10 inches.
Neck circumference, 13 inches.....$14\frac{1}{4}$ inches.
Chest, 31 inches....................37 "
Forearm, $9\frac{1}{2}$ inches..................11 "

Biceps straight, $9\frac{1}{2}$ inches	12 inches
Biceps flexed, 11 inches	14 "
Shoulder, 16 inches	$18\frac{1}{2}$ "
Waist, $25\frac{1}{2}$ inches	29 "
Thigh, $18\frac{1}{2}$ inches	$19\frac{1}{2}$ "
Calf, $12\frac{1}{2}$ inches	$13\frac{3}{4}$ "
Chest expansion, 2 inches	6 "

APPENDIX H.

G. D. Pratt, aged seventeen ; one year's work.

Weight, 129 pounds	139 pounds.
Height, 5 feet $6\frac{1}{2}$ inches	5 feet $6\frac{5}{8}$ inches.
Neck circumference, 13 inches	$13\frac{3}{4}$ inches.
Chest, $31\frac{3}{4}$ inches	$36\frac{1}{2}$ "
Forearm, 10 inches	$10\frac{1}{2}$ "
Biceps straight, 10 inches	$11\frac{1}{2}$ "
Biceps flexed, $11\frac{1}{2}$ inches	$13\frac{1}{4}$ "
Shoulder, $16\frac{1}{4}$ inches	17 "
Waist, 27 inches	$28\frac{1}{2}$ "
Thigh, 19 inches	$20\frac{1}{4}$ "
Calf, 13 inches	14 "
Chest expansion, 3 inches	6 "

APPENDIX I.

J. Bowles, aged fourteen, son of Dr. S. W. Bowles, of Springfield, Mass. ; seven months' practice, from December 16, 1882, to March, 1883, and from March 1 to June 1, 1884.

Height, 5 feet $\frac{3}{4}$ inch	5 feet 4 inches.
Neck circumference, 11 inches	$12\frac{1}{2}$ inches.

Chest, 28 inches	32	inches.
Forearm, $8\frac{3}{4}$ inches	$9\frac{1}{2}$	"
Biceps straight, $8\frac{1}{4}$ inches	$9\frac{1}{4}$	"
Biceps flexed, $8\frac{1}{2}$ inches	$10\frac{1}{2}$	"
Shoulder, $13\frac{1}{8}$ inches	15	"
Waist, 23 inches	25	"
Thigh, $17\frac{1}{2}$ inches	$18\frac{1}{4}$	"
Calf, $11\frac{3}{4}$ inches	$12\frac{1}{2}$	"
Chest expansion, $2\frac{1}{4}$ inches	4	"

APPENDIX J.

D. L. Dowd, the author, aged twenty-three ; results of a little over four years' practice, commencing at an age when men are supposed to have attained full development physically, from October 1, 1877, to May 1, 1882.

Weight, 138 pounds	163	pounds.
Height, 5 feet 7 inches	5 feet 8	inches.
Neck circumference, 14 inches	17	inches.
Chest, 36 inches	42	"
Forearm, 10 inches	$12\frac{1}{2}$	"
Biceps straight, $11\frac{1}{2}$ inches	$13\frac{1}{2}$	"
Biceps flexed, 13 inches	$15\frac{1}{2}$	"
Shoulder, 18 inches	$19\frac{1}{2}$	"
Waist, 29 inches	31	"
Thigh, 20 inches	22	"
Calf, 14 inches	$15\frac{1}{4}$	"
Chest expansion, $4\frac{1}{2}$ inches	11	"

The contrast between a photograph of Mr. Dowd's form taken before he commenced systematic work and one taken three years later is most striking.

The one shows a thin, flat-chested, almost consumptive-looking man ; the other a model of manly strength. Said photographs are to be seen at the Home School for Physical Culture, 9 East Fourteenth Street.

It will be observed that these pupils ranged all the way from nine to forty years, when commencing practice.

Such results need no comment. They show that the human body is not like the iron casting, rigid and fixed like a mould, but rather like the sculptor's clay, that may be moulded into forms of beauty and strength, or—"more's the pity"—may be deformed and spoiled.

FINIS